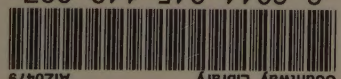




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PRACTICAL  
MANUAL OF OBSTETRICS

DR. E. VERRIER,

LECTURER ON OBSTETRICS IN THE FACULTY OF MEDICINE OF PARIS

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FOURTH EDITION, ENLARGED AND REVISED

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*With the Four "Obstetric Tables" of Professor Pajot*

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One Hundred and Five Illustrations

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FIRST AMERICAN EDITION,

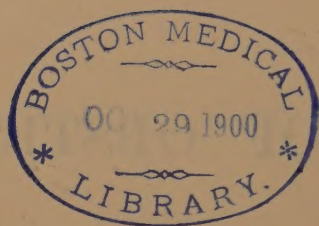
WITH REVISION AND ANNOTATIONS BY

EDWARD L. PARTRIDGE, M.D.,

PROFESSOR OF OBSTETRICS IN THE NEW YORK POST-GRADUATE MEDICAL SCHOOL

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## PREFACE TO THE FIRST EDITION.

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IF ever a methodical and exact *résumé* of any branch of medicine is of practical utility alike for physician and student, *obstetrics* is the branch that pre-eminently demonstrates such utility.

Our greatest masters did not disdain to write handbooks and complete treatises upon the art of midwifery. Baudelocque and Naegele have given us models that could not be surpassed to-day, were it not for the extraordinary scientific movement of the last forty years, which has affected obstetrics as much as general medicine.

Now borrowing from, now adding to, the various and multitudinous new facts and ideas that to-day constitute medical science, obstetrics, whose aim is to embrace all questions bearing on the preservation of our species, has rightfully become so vast a subject that it is divided up into many branches, which every day grow more and more into distinct and separate sciences.

Gynæcology, in its relationship to reproduction, embryology and teratology, ———— these are but large branches from the same medical tree; and we cannot deny, without being illogical, that they have an obvious affiliation with the great function of perpetuating the human species.

In its popular acceptance, modest and narrow as it is, obstetrics still presents a considerable degree of complex and diverse matter, and imposes on both memory and observation no small task.

To give a *résumé* of the work imposed, and to aid the memory, are the objects of this manual.

Desirable as are these results for the student, they are still more necessary for the physician.

Almost always called upon unexpectedly, the obstetrician has not the time to ponder and meditate which the physician and surgeon have, the former over his ordinary cases, and the latter, except in a few instances, before he begins an operation. There is no spare time

for the obstetrician; to weigh and consider "the best means" is impossible. A decision must be reached in a few moments, for the case is usually urgent.

If this be so, is it not indispensable to rapidly review, during the odd intervals between busy hours of practice, the chief laws, the prime precepts, the rules for certain operations, etc., etc.?

For the student we view matters from a different standpoint.

He has studied the larger treatises on obstetrics, he has attended the clinics, he has looked on at operations, and has "had his case." Examination is near; in a few days he must memorize and summarize all his knowledge, and resolve all his doubts, while time is pressing. The utility to him of a handbook is apparent.

To try to learn medicine, surgery, or obstetrics from a manual is utter folly; but to regard such a work as a handy *résumé* and aid to classification seems proper.

This, at least, is my humble opinion.

You desired me, my dear Verrier, to introduce this work to the public. Your book has no need of a recommendation from your old preceptor. Long before you ceased to be a close student at my lectures and clinics, you were yourself a teacher, and hence my name placed at the foot of this page is not a support, but a token of esteem and affection.

PROFESSOR PAJOT.

## PREFACE TO THE FOURTH EDITION.

---

A BOOK that has passed through three editions has an established reputation.

It only remains to state that in this, the fourth edition, we have endeavored to place the book abreast of the advance of science; and we trust that, with its improvements, revisions, and additions, it may continue to be received by the medical public as it has been in the past.

DR. E. VERRIER.





## PREFACE TO THE AMERICAN EDITION.

---

It would seem unnecessary, perhaps, to call attention to the eminence of Dr. Verrier and Professor Pajot, yet many of the busy practitioners of our country are unfamiliar with the works of medical leaders in other countries, and to them we would say that the reception accorded to this book in France—as indicated by the short time required for it to reach a fourth edition—is due largely to the known ability of these authorities.

The book commends itself as well. It belongs to a class of which there are comparatively few accorded to the English reader of obstetrical literature, being intermediate to the student's manual and the elaborate treatise. It is very complete, of a practical nature, and full of thoughts and suggestions which, because they belong, oftentimes, to the practice of another country, are not, therefore, to be overlooked.

We think in permitting the translation of this book the publishers have acted wisely, and they are fortunate also in having secured the services of DR. LEIGH H. HUNT as translator.

As American editor we have endeavored to add that only which seemed actually called for out of respect to the position of obstetrical advance in this country.



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# PRACTICAL HANDBOOK OF OBSTETRICS.

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## Part 1.

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### DEFINITIONS.

THE *art of midwifery*, according to Dubois and Pajot, consists of all the knowledge we possess relative to the reproduction of our species, regarded from the important standpoint of the part played therein by the female. This definition includes a multitude of subjects, whose consideration is out of place in a manual. Hence we shall limit ourselves to define child-birth or delivery—a function most frequently physiological, and one wherein the uterus rids itself of the product of conception, and thus terminates pregnancy.

Pregnancy is that peculiar condition of the female, commencing from the moment of conception and ending with the expulsion of the foetus and its appendages, that is to say, with delivery. Delivery usually occurs from the 260th to the 280th day after conception, the average being 270 days, or nine months. *Premature delivery* is that occurring from the 180th to the 250th day of conception; it may be *spontaneous* or *induced*. On the other hand, *delayed labor* is that occurring after the 280th day; it is rare.

*Abortion* is the expulsion of the ovum and its appendages, occurring any time from conception to the 180th day, the foetus being considered viable after the latter period (Article 314 of the Civil Code of France).

Delivery, as we have said, is most frequently a physiological function; but it may assume a pathological character, whence we have two chief divisions: (1) physiological delivery; (2) pathological delivery. Patho-

logical delivery cannot be studied until the physiological or normal variety is perfectly understood ; hence we shall commence with the study of the latter.

Before proceeding further, however, it is well to briefly review the anatomy of the pelvis, dwelling mainly on its axes and dimensions, viewed from an obstetrical standpoint. In this way we shall obtain a concise knowledge of the anatomy of the female genitals, and so be better able to appreciate the changes which they undergo during pregnancy.



## CHAPTER I.

### FEMALE ORGANS OF GENERATION.

#### ARTICLE I.—THE BONY PELVIS.

THE pelvis is a kind of bony girdle, situated at the lower part of the trunk, which latter it supports, lying beneath the vertebral column and above the lower extremities, on which it, in turn, is supported.

Considered as a whole, it has the form of a hollow cone, whose base looks upward and somewhat forward, and whose apex—truncated—looks downward and backward.

In the adult it is formed of four bones: the sacrum and coccyx in the median line; and the ilia laterally and in part anteriorly.

§ 1. THE SACRUM.—The sacrum is a single symmetrical bone, and is wedged in at the posterior portion of the pelvis, between the ilia, beneath the lumbar vertebræ, and above the coccyx. Its direction, from above downward, is from before, backward. It forms, with the last lumbar vertebra, a marked angle anteriorly, called the *promontory* or the *sacro-vertebral angle*. The sacrum is curved on itself from behind forward; and its concavity, varying in degree in different individuals, looks forward. The form of the sacrum is that of a triangular pyramid, with a central canal continuous with the spinal canal, and whose upper opening is the larger. It presents for consideration:

1. An *anterior* or *pelvic face*, smooth, concave, and marked by shallow grooves that separate four or five transverse ridges which represent the union of the false sacral vertebræ. Laterally are the four anterior sacral foramina whence escape the anterior branches of the sacral nerves. These foramina run obliquely into the substance of the bone thus protecting the contained nerves from compression.

2. A *posterior face*, convex and rough, presenting in the median line the sacral crest, a continuation of the spinous processes of the vertebræ. On either side are the sacral grooves pierced by four posterior sacral foramina. At the extreme edges are rough projections for the insertion of the sacro-iliac ligaments.

3. Two *lateral surfaces*, thick above where there is an articular surface, crescentic in shape for articulation with the corresponding surface on the

ilium; and narrow, even sharp, below where the sacro-sciatic ligaments are attached.

4. A *base*, looking upward and forward, oval in form, with the longer diameter running transversely for articulation with the last lumbar ver-



FIG. 1.—Anterior Surface of the Sacrum. 1, Surface articulating with the last lumbar vertebra; 2, articular processes; 3, antisacral foramina; 4, transverse ridges, the union of original segments.



FIG. 2.—Posterior Surface of Sacrum. 1, Sacral canal; 2, articular surface for the os innominatum; 3, crest; 4, posterior foramina; 5, sacral cornua; 6, articular surface for the coccyx.

tebra. At the sides is a smooth, triangular surface, the continuation of the internal iliac fossa; this is the ala of the sacrum whose rounded border aids in forming, posteriorly, the superior strait.

5. A rounded *apex* looking backward and articulating with the coccyx.

§ 2. THE COCCYX.—The coccyx has the same form as that of the sacrum in miniature. It is made up of three or four very small bones, united with one another by ligaments, and which unite at the age of forty. It presents:



FIG. 3.—Coccyx. Anterior and posterior surfaces.

1. An *anterior face*, continuous with and resembling that of the sacrum.

2. A *posterior face*, rough and subcutaneous.

3. Two *lateral faces*, narrow and tuberculated for the insertion of the sacro-sciatic ligaments.

4. A *base*, which is concave from side to side to fit the convexity of the apex of the sacrum.

5. A teat-like *apex*, for the insertion of the levator and sphincter ani.

§ 3. THE OS INNOMINATUM, OR COXAL BONE.—The os innominatum—one of a pair—is unsymmetrical, of an irregular quadrilateral shape, as if twisted on itself, and larger at its extremities than at its centre, which is constricted. It is formed of three bones, the *ilium*, the *ischium*, and the *pubis*. These three bones, separated in infancy by plates of cartilage in the form of the letter Y, unite about the age of puberty to form the coxal bone: the point of union of these three bones is the bottom of the cotyloid cavity. The os innominatum forms the lateral and anterior walls

of the pelvis, and presents an internal and external surface and four borders.

1. The *external surface* presents above a large area, alternately concave and convex, known as the external iliac fossa, and covered by the gluteal muscles; lower down and to the inside is the acetabulum for articulation with the head of the femur. Below this, and still farther in, is the obturator or subpubic foramen; then comes a surface more or less concave, giving attachment to numerous muscles.

2. The *internal surface* is divided into two parts; the upper, large and concave, forms the internal iliac fossa and is covered by the iliac and psoas muscles; behind is an articular surface resembling the lateral facet upon the sacrum, with which it articulates.

The lower portion presents, laterally, a flat quadrilateral surface corresponding to the acetabulum; more internally is the subpubic foramen, and in front is the internal surface of the body of the ischium and the pubis.



FIG. 4.—Os Innominatum, External Surface. 1, Iliac crest; 2, external iliac fossa; 3, acetabulum; 4, horizontal ramus of pubis; 5, articular surface of symphysis; 6, ascending portion of ischium; 7, its tuberosity; 8, obturator foramen; 9, anterior superior spine of ilium; 10, anterior inferior spine.



FIG. 5.—Os Innominatum, Internal Surface. 1, Iliac crest; 2, internal iliac fossa; 3, articular surface of pubis; 4, ascending ramus of ischium; 5, spine of ischium; 6, articular surface for sacrum; 7, surface for ligaments; 8, thyroid foramen.

3. *The Borders.*—The superior border, or iliac crest, curves outward and is shaped like an italic *S*, being narrower at the centre than at the extremities. It terminates in front in the anterior superior spine of the ilium; behind in the posterior superior spine of the ilium.

The inferior border is shorter; anteriorly it is vertical where it helps to form the symphysis pubis; more externally along that portion which forms the pubic arch it runs obliquely.

The *anterior border* is concave, running obliquely at the sides and nearly horizontally in front. The following are prominent upon it: the anterior superior spine of the ilium, a large notch, beneath which is the anterior

inferior spine of the ilium, and the groove for the tendons of the psoas and iliacus, bounded internally by the ilio-pectineal eminence. Adjoining a horizontal triangular surface are, finally, the spine and angle of the pubis.

The posterior border is very irregular. Above is the rough eminence called the posterior superior spine of the ilium, then a small notch, underneath which is the posterior inferior spine of the ilium, and below this lies the great sciatic notch, the spine, and finally, the great sciatic tuberosity, or *tuber ischii*.

## ART. II.—ARTICULATIONS OF THE PELVIS.

The pelvic bones are united together by means of ligaments which insure solidity of the articulations. There are five articulations, two—the sacro-iliac—being similar. They are all symphyses, belonging to the amphiarthrotic class of joints.

§ 1. SYMPHYSIS PUBIS.—This articulation is formed by the coaptation of the oval facets that mark the vertical portion of the pubic bone. The ligaments are :

1. The *anterior pubic ligament*, with very thin fibres which inosculate as they cross from side to side.



FIG. 6.—Anterior Surface of Symphysis Pubis. Vertical Section through Deep Structures. 1. Superior ligament; 2, triangular ligament; 3, 4, interosseous ligament.

2. The *posterior pubic ligament*, thinner even than the above, which is merely an expansion of pubic periosteum posteriorly.

3. The *superior pubic ligament*, thick and fibrous, investing the superior borders of the pubic bones, and joining the two together.

4. The *triangular inferior ligament*, very strong and made up of interlacing fibres. It gives an irregular curve to the pubic arch.

5. The *fibro-cartilaginous interosseous ligament*, shaped like a wedge with the base looking forward.

This fibro-cartilage forms a little ridge behind which projects beyond the bones, having in some individuals a nodule at its central portion, which Pinard regards as the anterior extremity of the smallest sacro-pubic diameter, a point we shall consider later on.

Concerning the interosseous fibro-cartilage, Cruveilhier observed that there were diversities in, respectively, the planes of continuity and contiguity of the articular surfaces. At times these surfaces were almost wholly in perfect continuity; again, on the other hand, they were contiguous throughout their whole extent.

The height of the symphysis pubis is variable. When measured from the superior ligament to the concave border of the triangular ligament, it is found to be between 4 and 5 ctm. ( $1\frac{1}{2}$  to 2 in.).



§ 2. SACRO-ILIAC SYNCHONDROSIS.—This is formed by the junction of the auricular-shaped sacral facet and that of the ilium, invested with a diarthrodial cartilage. The ligaments are :

1. The *anterior sacro-iliac ligament*, whose fibres are small and which runs from the concave surface of the sacrum to the coxal bone.

2. The *posterior, or interosseous ligament* is composed of strong ligamentous fasciculi, and runs horizontally from sacrum to os innominatum.

3. The *superior ligament* is very thick and unites the base of the sacrum with the adjacent portion of the ilium.

4. The *inferior, or vertical ligament* is an unyielding fibrous band running from the posterior superior spine of the ilium to a thick tubercle near the third sacral foramen posteriorly.

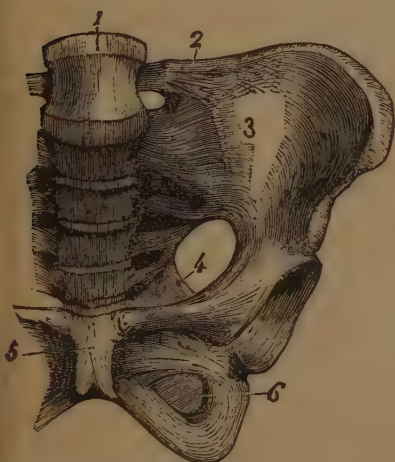


FIG. 7.—Pelvic Ligaments. 1, Anterior vertical ligament; 2, ilio-lumbar; 3, anterior sacro-iliac; 4, great sacro-sciatic; 5, anterior pubic; 6, obturator membrane.

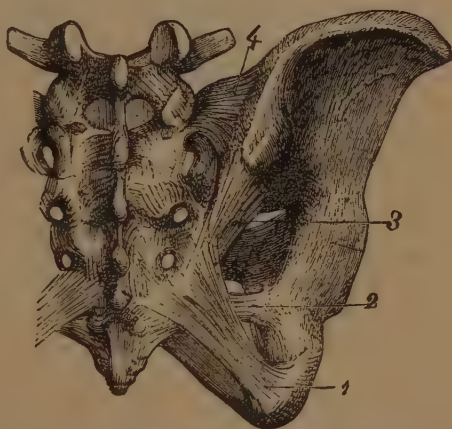


FIG. 8.—Posterior Ligaments. 1, External pubic; 2, great sacro-sciatic; 3, lesser sacro-sciatic; 4, posterior sacro-iliac.

5. The *greater sacro-sciatic ligament*, situated at the lower and back part of the pelvis, is triangular in shape, flattened, and looks as if it were bent upon itself at its centre, at which point it is constricted. It expands at its extremities, which are inserted, respectively, into the posterior inferior spine of the ilium and along the whole length of the narrow borders of the sacrum and coccyx, and, after running outward and downward, into the tuber ischii.

6. The *lesser sacro-sciatic ligament* also arises from the margins of the sacrum and coccyx; it is inserted into the spine of the ischium. The last two ligaments strengthen the sacro-iliac articulation; they convert the sciatic notches into foramina. English obstetricians regard the sacro-iliac articulation as possessing the power of motion during pregnancy.



§ 3. SACRO-COCYGEAL ARTICULATION.—This is formed by the base of the coccyx and the apex of the sacrum. The ligaments are :

1. An *interarticular fibrous disk* and a synovial membrane to which the joint owes its mobility.

2. The *anterior* and *posterior* ligaments, formed of parallel fibres, running from the anterior and posterior surfaces of the sacrum to corresponding surfaces of the coccyx.

Tarnier believes that there are inter-coccygeal articulations ; but these disappear when the separate pieces of the coccyx unite to form one bone.

§ 4. SACRO-VERTEBRAL ARTICULATION.—This is formed by the base of the sacrum and the last lumbar vertebra. At this joint are found :

1. An *interosseous fibro-cartilaginous disk*, which is very thick, especially in front and at its periphery.

2. *Ligaments* in front and behind, which are the continuations of the anterior and posterior vertebral ligaments.

3. The *sacro-vertebral ligament* is a short and thick fasciculus stretched obliquely from the transverse process of the fifth lumbar vertebræ to the base of the sacrum.

4. The *ilio-lumbar ligament* arises from the same process and runs to the iliac crest.

There are, besides, two lateral arthrodia, uniting the sides of the base of the sacrum with corresponding articular surfaces of the fifth lumbar vertebra. These articulations have five ligaments and a capsule.

To complete the pelvic walls there are the subpubic or obturator membrane and the Fallopian ligament. The former extends along the circumference of the obturator foramen, and in the fresh state is covered by the obturator muscles. At its upper portion is a small oval orifice, forming, with the groove that runs in this part of the bone, the *obturator canal*, through which pass the vessels and nerves of that name.

Fallope's ligament corresponds to the fold of the groin ; it is aponeurotic and fixes the line of demarcation between thigh and abdomen.

### ART. III.—THE PELVIS IN GENERAL.

Taken as a whole the pelvis, as has already been said, has the form of a hollow cone whose base is uppermost and looks forward, and whose apex, truncated, is directed downward and backward. The pelvis contains the genitals in women, supports the uterus in pregnancy, and offers a passage for the delivery of the foetus. While its joints are intended to form a single solid piece of bone ; they are nevertheless capable of diminishing the shock which this part of the economy is prone to receive in walking, running, or jumping, and from falls, etc. It is in pregnancy that this function is most useful and incontestable. The pelvis has not an absolute horizontal direction. Compared with the trunk's axis it is inclined, and

the angle which its axis forms with that of the body is called the inclination of the pelvis. To this we shall recur when we come to describe the "straits."

The pelvis is divided into an internal and an external surface.



FIG. 9.—Pelvis in General. 1, Sacro-lumbar articulation; 2, sacro-iliac articulation; 3, crest of ilium; 4, symphysis pubis; 5, ascending ramus of ischium; 6, thyroid foramen; 7, acetabulum.

§ 1. THE EXTERNAL SURFACE.—Four regions are to be studied upon this surface :

An anterior portion, which, in the mesial line, shows the symphysis pubis, the body of the pubis, the horizontal ramus of the pubis and the obturator foramen.

A posterior portion, which is the rough convex surface of the sacrum.

Two lateral faces that above show the external iliac fossa ; and, below the posterior aspect of the sacro-sciatic ligaments, the sciatic notch, and just in front the cotyloid cavity.

§ 2. THE INTERNAL SURFACE.—This is the more important of the two. Vesalius compares it with a barber's dish (saucer). This ancient comparison is inexact. Its form is irregular ; it has two well-marked portions—one, upper and expanded, called the greater pelvis, and a lower contracted portion, the "lesser pelvis," or "pelvic cavity."

The *greater pelvis* has its *anterior wall* formed by the abdominal muscles in the living subject, and the *posterior wall* has an opening which holds the last lumbar vertebra. The *lateral walls* are formed by the internal iliac fossæ. From one anterior superior spine to the other is 26 to 27 ctm. ( $10\frac{1}{2}$  in.); from one iliac crest to the other—the line drawn touching the vertebra—is 27 to 28 ctm. (11 in.). The distance from the crest of the ilium to the innominate line is 9 ctm. ( $3\frac{1}{2}$  in.), and the iliac fossæ are 9 to 11 mm. deep ( $\frac{1}{3}$  to  $\frac{2}{5}$  in.). But these measurements are very variable, and merely indicate the averages.

The *lesser pelvis* is a canal curved anteriorly, and slightly contracted at either extremity which is called the "*strait*." It has been likened to a barrel. It presents four walls and two circumferences.

The *anterior wall* looks back and up, when the individual is in the upright position, and corresponds to the posterior face of the symphysis pubis; external to this is a plane surface, viz., the body of the pubis, and then the internal obturator fossa.

The *posterior wall*, concave from above downward, is formed by the anterior faces of the sacrum and coccyx. The *lateral walls* present in front a large quadrilateral bony surface corresponding to the cotyloid cavity; farther back is the internal surface of the large and small sacro-sciatic ligaments and internal aspect of the greater and lesser sacro-sciatic notches.

The "*lesser pelvis*," limited above and below by the superior and inferior straits, is excavated centrally; this is the pelvic cavity.

§ 3. THE SUPERIOR STRAIT.—This is the circular bony rim which forms a natural line of demarcation between the greater and lesser pelvic cavities. It is formed, posteriorly, by the sacro-vertebral angle and *alæ* of the sacrum; on the outside and laterally by the blunt and rounded rim which bounds the bottom of the internal iliac fossa; in front it is continuous

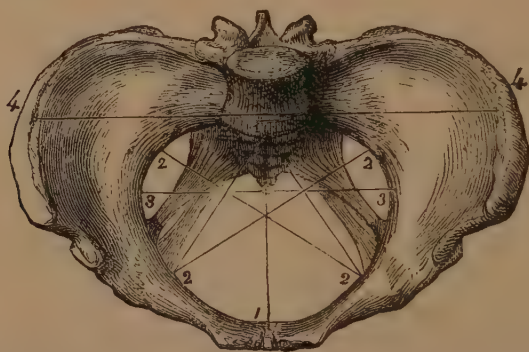


FIG. 10.—Diameters of Superior Strait. 1, Antero-posterior or sacro-pubic; 2, right and left oblique; 3, transverse; 4, bi-iliac; 1-2, right and left sacro-cotyloid.

with the horizontal ramus of the pubis up to the symphysis of that bone. Its form is that of a triangle—whose angles are rounded—the base being posteriorly and the apex at the symphysis. It has been compared to the heart on a playing-card. It has a *plane* and *axis* and six *diameters*.

The plane that passes through the superior strait is oblique, running downward and forward. It forms an angle of about sixty degrees with the horizon in the female when standing upright. The axis of the superior strait, in the female, is represented by a line drawn from the umbilicus to the junction of the upper two-thirds and lower third of the coccyx, cutting the plane of the strait at right angles to its surface. This line runs down-

ward and backward from the navel. The study of these dimensions is of the utmost importance, the first to be considered being—

1. The *antero-posterior* or *sacro-pubic* diameter runs from the sacro-vertebral angle to the summit of the symphysis pubis. It is 11 ctm. ( $4\frac{1}{2}$  in.) on the average, but, because of the projection from the posterior surface of the symphysis pubis, we can only consider the smallest sacro-pubic diameter, called the working diameter (*diamètre utile*), which varies from  $9\frac{1}{2}$  to  $10\frac{1}{2}$  ctm. (3 to 4 in.).

2. The two *oblique diameters* pass from the ilio-pectineal eminence of one side to the sacro-iliac synchondrosis of the other. The left oblique is the one commencing at the ilio-pectineal eminence of the left side. [The majority of standard text-books in the English language designate the left oblique diameter as that starting from the *left sacro-iliac synchondrosis*, the right oblique diameter commencing at the right synchondrosis.—Ed.] Both obliques measure 10 ctm. (3.9 in.).

3. The *transverse diameter* runs from the centre of the lower border of the iliac fossa of one side to a corresponding point on the other. It is  $13\frac{1}{2}$  ctm. long (5 in.).

4. The two *sacro-cotyloid* lines are measured from the sacro-vertebral angle to the posterior portion of the acetabulum on each side. They are 9 ctm. long ( $3\frac{1}{2}$  in.). The circumference of the superior strait or *innominate line* measures, on the average, 40 ctm. ( $15\frac{3}{4}$  in.).

§ 4. THE INFERIOR STRAIT.—The inferior strait has a very irregular contour, but tracing it on a sheet of paper on which the pelvis is placed, it shows a more regular oval form, with the longest diameter antero-posteriorly. It presents three bony projections: the coccyx behind and the tuber ischii of each side, separated by three large notches, viz.: the pubic arch in front and the two sciatic notches at the sides, the latter rendered shallower by the presence of the sacro-sciatic ligaments.



FIG. 11.—Diameters of Inferior Strait. 1, Antero-posterior, or coccyx-pubic; 2, right and left oblique; 3, transverse or bi-ischiatric.

The plane of the inferior strait has a slight obliquity, the inclination running downward and backward. In the upright position it forms an angle of  $11^\circ$  with the horizon, but during delivery the retrocession of the coccyx nearly effaces this angle; indeed, the direction of all these planes varies with the changing attitude of the individual.

The axis of the inferior strait is a line drawn from the sacro-vertebral



angle to a mid-point between the tuber ischii, just in front of the anus. The diameters of the inferior strait, all 11 ctm. long ( $4\frac{1}{8}$  in.), are :

1. The *antero-posterior* or pubo-coccygeal diameter runs from the apex of the coccyx to the lower portion of the symphysis pubis. In young women the mobility of the sacro-coccygeal articulation may, during delivery, increase this diameter to  $12\frac{1}{2}$  ctm. ( $4\frac{1}{2}$  in.).

2. The two *obliques* extend from the point of junction of the ascending ramus of the ischium with the descending ramus of the pubis on one side to the centre of the great sacro-sciatic ligament on the other ; and the elasticity of these ligaments allows an increase in these diameters during delivery, when they may measure  $11\frac{1}{2}$  to 12 ctm. ( $4\frac{1}{2}$  in.).

3. The *transverse*, or bi-ischiatic diameter, extends from the tuber ischii of one side to that of the other, and measures constantly 11 ctm. ( $4\frac{1}{8}$  in.).

§ 5. THE PELVIC CAVITY.—The true pelvis is the space of the lesser pelvis bounded by the planes of the superior and inferior straits. For lovers of comparisons we may say that this cavity is of the form of two

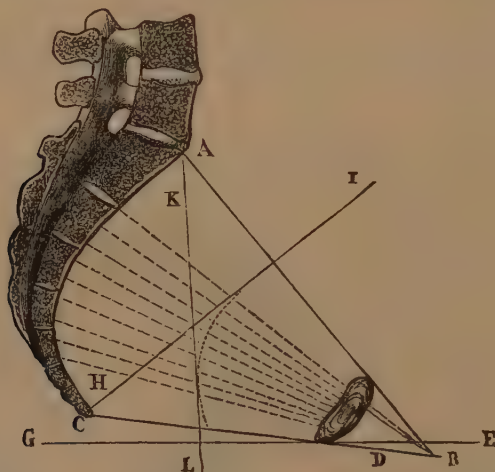


FIG. 12.—Pelvic Planes and Axes. A B. Plane of superior strait; C B. plane of inferior strait; I H, axis of superior strait; K L, axis of inferior strait; I L, axis of pelvis; G E A, horizontal line.

truncated cones joined at their bases. Its anterior wall, formed by the posterior surface of the symphysis pubis, is 4 ctm. high ( $1\frac{3}{8}$  in.); its posterior wall, formed by the sacral curve, measures  $13\frac{1}{2}$  ctm. ( $5\frac{1}{4}$  in.). The lateral walls measure  $9\frac{1}{2}$  ctm. ( $3\frac{3}{4}$  in.). Upon the lateral walls of the pelvis are two smooth inclined planes, one running obliquely from behind forward, and the other from before backward. These are the anterior and posterior inclined planes of the pelvis; both are about 10 ctm. high (3.9 in.). The older obstetricians regarded these inclined planes as the cause of rotation of the head of the fœtus within the pelvis. But observation proves that rotation often occurs in an opposite direction to that



which these inclined planes would apparently induce; witness the spontaneous reduction of occipito-posterior positions.

Further, rotation almost always occurs beneath the sphere of action of these planes, *i.e.*, when the head of the foetus rests upon the perineum. P. Dubois has proved, by experiments easily verified, that the rotation which the head and shoulders undergo in the pelvis is due to the perineal resistance.

Should it be desired to repeat this experiment, it will be found that, taking a small foetus and placing it within the pelvis of a female cadaver prepared therefor, the head will rotate as soon as it reaches the perineum, so that the occipito-frontal diameter will coincide with the antero-posterior diameter of the inferior strait, provided the foetus is pushed obliquely in the direction of the axis of the superior strait. As has been said, the antero-posterior diameter of the inferior strait is the best adapted for exit of the head. Should this experiment be repeated a second and then a third time, with larger and larger foetal cadavers, identical rotary movements occur. If, subsequently, the first foetus is used to begin anew the same manœuvre, the head no longer rotates and reaches the vulva obliquely. This is because the perineum in the female cadaver used has lost its elasticity, and not having returned to its primary form and being considerably distended by the passage of larger and larger bodies, no longer offers any resistance to the progress of the smallest head, the result of which is that the latter presents obliquely at the vulva without having rotated.

From these data it may be concluded that the inclined planes are not the cause of rotation of the head, but that this cause is the resistance of the parts forming the pelvic floor, or rather is the "law of accommodation of labor" which Professor Pajot so well formulates in the "Dictionnaire Encyclopédique des Sciences Médicales" (art. *Accouchement*).

The diameters of the pelvis, all taken through its centre, measure 12 cms. ( $4\frac{3}{4}$  in.); in direction they are similar to those of the straits.

If, now, a curved line be drawn between the points where the axes of the straits cross their respective planes and which shall pass just in front of the intersection of these axes, it will obviously represent the axis of the pelvis (see Fig. 12). This line will coincide above with the extremity of the axis of the superior strait, and below with the axis of the vulva. It will run parallel to the sacrum, *i.e.*, will be straight in that part of the pelvis corresponding to the first and second sacral vertebræ, and curve throughout the rest of its course. The axis of the pelvis is the line which the obstetrician's hand and instruments should follow when an entrance into the womb is attempted. One cannot keep this too clearly in mind, for it is very important.

§ 6. THE PUBIC ARCH.—This is a large notch situated in front of the inferior strait. It is 60 mm. high ( $2\frac{1}{8}$  in.); 95 mm. wide below, and 27 above (*i.e.*,  $3\frac{3}{4}$  in. and 1 in.). The angle of the pubic arch is  $76^{\circ}$ . The

bony borders of the pubic arch (each formed by the descending ramus of the pubis and the ascending ramus of the ischium) are, in the female, curved outward. Joulin (page 18 of his "Treatise") states that the tuber ischii, being upon a plane 15 mm. below a subpubo-coccygeal line, whatever obstacles to delivery are met with in the inferior strait appear only in succession; and hence this strait may be regarded as consisting of two parts, an upper and a lower.

§ 7. DIFFERENCES BETWEEN THE MALE AND FEMALE PELVIS.—The male pelvis is deeper but less capacious than that of the female; and while the latter's shoulders are smaller than her hips the reverse is the case in man. In the male the bones are rougher and more compact; the fibro-cartilages are half as thick, the articulations are closer and firmer, the obturator foramen is narrower, and oval or elliptical, the iliac fossæ bends farther inward than in the female; the pelvis has a more conical form; the sacrum is less concave, smaller, and makes a smaller angle with the spine. The ischial tuberosities are closer together and are not directed as far outward as in the female. The superior strait is heart-shaped, having its antero-posterior diameter greater than in the female; the sacro-vertebral angle is less prominent. The subpubic angle is more acute ( $75^{\circ}$ – $80^{\circ}$  to  $90^{\circ}$ – $100^{\circ}$  in the female); the rami of the pubis are thick, straight, and are not directed forward, and the coccyx is often united with the sacrum.

Still the difference in the size of the hips in the two sexes is not as great as it seems; on account of the more slender figure of the female the contrast seems greater than it really is. And the more masculine form of women who are commencing to grow fat is proof of this.

In the Mongolian and Negro races the differences are not so great as one would be led to suppose at first view. The transverse diameter is, however, a little smaller, whereas the antero-posterior diameter is a fraction of an inch greater, which tends to give the pelvis a more quadrilateral shape (Joulin). Moreover, the diameters of the head of the negro foetus differ from similar diameters of the Caucasian foetal head even more than the pelvic diameters of a negress differ from those of a white woman. The head is proportioned to the canal it has to traverse, and we know how readily the African and American savages endure childbirth. Concerning the foetal pelvis and that of a child for a short time after birth, we find it very narrow, and the true pelvis scantily developed compared with the larger pelvis; hence the marked prominence of abdomen in the new-born child, since the pelvic cavity cannot yet contain several organs which subsequently are to be held therein.

The diminished capacity of the pelvis in the new-born also results from faulty expansion of the iliac fossa, and from the quadrilateral and flat shape of the ilium at this period of life, that bone not having as yet become turned upon itself.

The pelvic inclination in early infancy is also much less than in the adult.

At about weaning time (*la deuxième enfance*) the characteristics just mentioned disappear, and in the third year of life the differences in the pelvis of the two sexes are quite marked; but it is not until the seventeenth year that the pelvis attains its full size, and the three bones of the os innominatum become united. [Child-bearing in women under twenty years of age quite commonly leads to subsequent pelvic breadth, producing a marked change in the female figure. This can be accounted for upon the supposition that complete ossification and full pelvic size is not attained until about that year.—Ed.]

The pelvis measurements viewed generally are smaller in the human species than in other animals, and the pelvis of the human male is, generally, smaller than that of the human female.

Studying the lower species (mammalians) the sacro-vertebral angle no longer exists, save in the monkey, which animal has much in common with man; the sacrum is almost on a line with the vertebral column. The two innominate bones are very close together, and though long drawn out they only form a kind of non-excavated ring; the two straits have one and the same axis, forming, with the axis of the body, almost a straight line; and it is on account of this and the more or less elongated head of the foetus in mammalians that delivery is so much easier in other vertebrate animals than in the human species.

I cannot close this study of the differences of the pelvis without mentioning—were it solely for its originality—a classification of mammalians according to their mode of delivery proposed by Joulin. It might be called the obstetrician's classification.

1. Pre-ischiatic deliveries. The foetus takes its exit in front of the ischial tubers. The human female is the one and only example.

2. Inter-ischiatic deliveries. The foetus comes out *between* the tuberosities of the ischia. The large guenons (pouched monkeys), opossums, and cabiai.

3. Post-ischiatic deliveries. This class is the most numerous, embracing animals having a short sacrum: domestic animals, mares, cows, and deer.

#### ART. IV.—DIFFERENCES DUE TO THE PRESENCE OF THE SOFT PARTS.

The soft parts lining the pelvic cavity modify to a greater or less extent its form and dimensions.

In the greater pelvis the anterior wall—wanting in the skeleton—is made up of the abdominal muscles. The internal iliac fossa is filled up by the iliacus and psoas, whose presence slightly alters the form of the superior strait, which, still resembling a triangle with rounded corners, has now its *base* in front and apex behind. The psoas muscles which run across from the spine to Poupart's ligament diminish, by 2 ctm. ( $\frac{3}{4}$  in.), the trans-

verse diameter. This diminution is least when the woman is supine, with the limbs slightly flexed and the head braced so as to put the muscles in their most relaxed condition. The rotundity of the psoas when the woman stands upright aids the occiput of the foetal head to glide forward or backward. The sacro-pubic diameter is diminished by the walls of the bladder and by the uterus; the obliques seldom vary, except the right oblique, because of the rectum.

Vessels and nerves also change the configuration of the greater pelvis. Thus the common iliacs, whence arise external and internal iliac and hypogastric arteries, which are accompanied by veins of the same name, aid in diminishing the transverse diameter and cover the fifth branch of the lumbar plexus which lies on the aponeurosis of the psoas external to the iliac

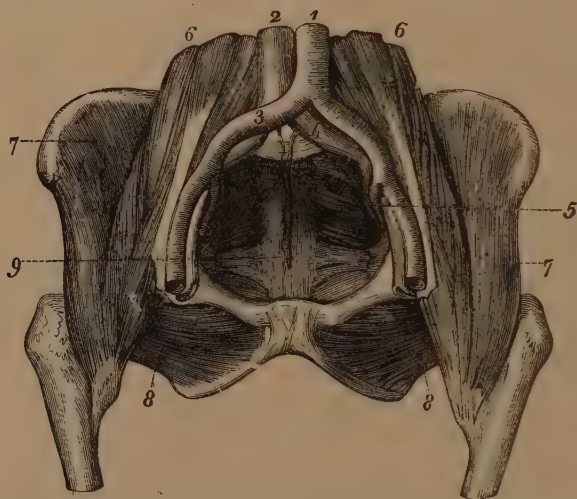


FIG. 13.—Pelvis with Soft Parts *in situ*. 1, Aorta; 2, inferior vena cava; 3, common iliac; 4, common iliac vein; 5, hypogastric artery; 6, psoas muscle; 7, iliac muscle; 8, external obturator muscle; 9, sacra media artery.

vessels. This protection, however, is not sufficient to prevent the crural nerves, when pressed on by the grand uterus, from causing cramps and numbness in the lower limbs. To sum up, the diameters of the superior strait are modified by the soft parts so that the antero-posterior measures 10 and the oblique and transverse each 11 ctm. ( $4\frac{1}{8}$  in.).

At the moment of delivery, however, when the limbs are flexed, all the muscles relaxed, and the foetal head is impelled by uterine contractions, the transverse diameter will become the largest, often measuring 12 ctm. ( $4\frac{3}{4}$  in.), *i.e.*, the length of the occipito-frontal diameter of the foetal head.

The cavity of the pelvis is diminished by the internal obturator muscles and pyriformis (which line the lateral walls), as well as by the rectum at the left, the latter perhaps causing the great frequency of left oblique po-



sitions. It is also diminished by the bladder and by cellular tissue, so that it scarcely measures more than 11 ctm. ( $4\frac{1}{3}$  in.) in any direction.

The *inferior strait*, wide open in the skeleton, is in life closed in by musculo-membranous tissue which supports the viscera; this is the floor of the pelvis formed by the perineal muscles and by three aponeurotic planes. The muscles of the perineum are: (1) The levator ani, which is inserted into one of the sides of the pelvis throughout its entire length, and into the median raphé of the perineum where it joins its fellow of the opposite side. (2) The coccygeus, which may be considered as the posterior fasciculus and continuation of the levator ani. (3) The sphincter ani, situated beneath the muscular plane of the levator ani, is circular and surrounds the lower opening of the rectum. Its lower fibres form the external sphincter, which is inserted posteriorly into the coccyx and the skin of that region, while in front it is continuous with the sphincter vaginæ, form-



FIG. 14.—Muscular Floor of Pelvis. 1, Constrictor vaginæ; 2, transversus perinei; 3, sphincter ani; 4, levator ani and coccygeus blended; 5, 6, ischio-cavernosus; 7, gluteus maximus.

ing with the latter a figure of 8. Its superior fibres cover those of the internal sphincter, and blend with those of the levator ani. (4) The *transversus perinei*, a little fleshy band, arises from the internal face of the tuber ischii beneath the erector clitoridis, and runs toward the median line where, joining with its fellow, it forms the anterior and dilatable portion of the perineum. (5) The *erector clitoridis* is at the lower border and internal face of the ischio-pubic ramus on either side; its fibres run from the tuber ischii upward, forward, and inward to the root of the corpora cavernosa of the clitoris, ending in the fibrous sheath which envelops that organ. (6) The *sphincter vaginæ*, formed like all sphincters and performing similar functions. The lower fibres inosculate with the sphincter ani at the perineum; while the upper fibres are inserted into the very substance of the clitoris and its suspensory ligament.

The inferior strait is diminished least of all by the soft structures. If the antero-posterior and the two obliques are diminished by the inter-



position of certain of the soft parts underneath the pubic arch, the transverse diameter remains unalterable. It is not to be forgotten that, with the exception of the latter, the diameters of the inferior strait are susceptible of enlargement during the passage of the foetal head.

The *perineum* is that space between the coccyx and the posterior commissure of the vulva. It measures 8 ctm. ( $3\frac{1}{4}$  in.), viz., from the apex of coccyx to anus,  $4\frac{1}{2}$  ctm. ( $1\frac{3}{4}$  in.); from anus to vulva,  $3\frac{1}{2}$  ctm. ( $1\frac{1}{2}$  in.). But during delivery it becomes thinner and is distended, especially at the expense of its anterior portion, when it may measure 12 to 15 ctm. ( $4\frac{3}{4}$  to  $5\frac{9}{10}$  in.), which, with the  $13\frac{1}{2}$  ctm. of the sacrum, forms a posterior wall for the pelvis of 25 to 28 ctm. ( $9\frac{3}{4}$  to 11 in.).

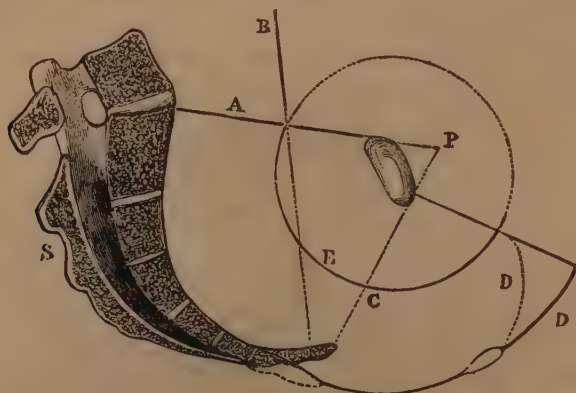


FIG. 15.—Pelvic Planes and Axes at Parturition. A P, Plane of superior strait; B, its axis; C P, plane of inferior strait; E, axis of pelvis; D, lower wall of pelvic canal when foetal head dilates vulva; D', same before dilatation.

Comparing the extent of this wall with the shortness of the anterior wall formed by the symphysis pubis, we can readily account for the difficulty and delay in deliveries where the occiput rotates backward.

Finally, in the recumbent posture, and when the head is about to pass the stretched perineum, the direction of the axes and planes thus varies: the plane of the superior strait, instead of being inclined up and back will be up and forward, and its axis will run from above downward and from behind forward. At the same time the plane of the inferior strait which ran down and back, will now look almost directly forward, its axis running undeviatingly from before backward. Furthermore, the terminal opening formed by the vulva presents a plane which, at the moment of delivery, runs upward and forward. Indeed, the line which the foetus follows during its exit, is a very marked curve whose concavity is directed almost directly upward. Such must be the direction taken by the hand or instruments when—the foetus still being in the superior strait—the obstetrician is called to interfere.

## CHAPTER II.

### SOFT STRUCTURES OF GENERATION.

#### ARTICLE I.—EXTERNAL PARTS.

§ 1. THE VULVA AND ITS APPENDAGES.—The vulva is a slit or longitudinal fissure situated at the lower part of the trunk in the median line, beneath the mons Veneris and in front of the perineum. It is bounded laterally by the labia majora, which are part and parcel of it. It presents the following:

1. The *mons Veneris* (“*pénil*”) is a rounded eminence at the lower part of the hypogastrium and just in front of the pubis. This eminence, formed of adipose tissue, is covered with hair at puberty.

2. The *labia majora* are two protecting lips of skin running from the mons Veneris to the perineum. They are covered with hair externally; while internally they are moist, smooth, and of a vermilion hue in virgins; while in married women they are less bright in color and less prominent. Joining behind, they form a bridle called the *fourchette*, situated above and inside the posterior commissure, and which is nearly always torn at the first delivery. A cutaneous and mucous covering, dartos and adipose tissue, vessels and nerves constitute the structures of the labia majora. Deep in them is found the terminal expansion of the round ligament of the uterus, also the vulvo-vaginal glands, which we shall consider later on.

3. The *labia minora* or *nymphæ* are two mucous folds seen in separating the labia majora. Narrow and close together at their origin, they enlarge and separate behind; above they pass around the clitoris and form a sort of hood called the prepuce of the clitoris. At birth they frequently project beyond the vulva.

4. The *clitoris* is a kind of reddish tubercle, erectile, very sensitive, and situated underneath the anterior commissure of the labia majora and surrounded by the hood formed for it by the nymphæ. It is formed of a corpus cavernosum whose roots are attached to the rami of the pubic arch.

5. The *vestibule* is the small surface limited by the clitoris above, the meatus below, and the nymphæ at the sides.

6. The *meatus urinarius* is the external orifice of the urethra. It is 27

mm. (1 in.) below the clitoris and just above the little tubercle which terminates the anterior column of the vagina. It is this tubercle which aids the obstetrician in the delicate task of introducing a sound into the bladder without uncovering the woman.

The urethral canal in woman is about 27 mm. long (1 in.) and runs horizontally to the neck of the bladder.

7. *The hymen* is placed at the orifice of the vagina and is a membrane separating the internal from the external genitals. It is formed by a fold of mucous membrane pierced by an opening, which varies in size, through which pass the menstrual fluid and utero-vaginal mucus. What remains after rupture is called "*carunculæ myrtiliformes*."

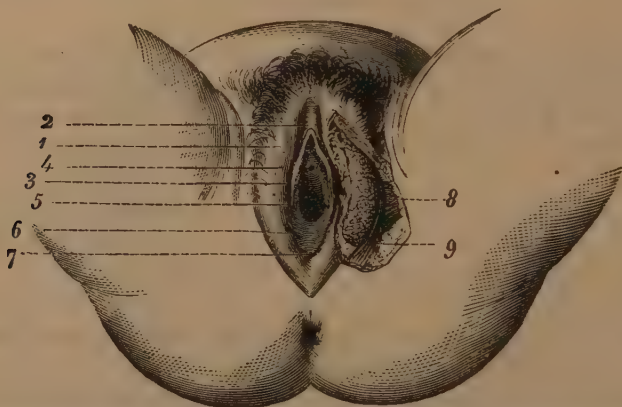


FIG. 16.—Vulva. 1, Labia majora; 2, clitoris; 3, nymphæ; 4, meatus urinarius; 5, opening of vulva; 6, hymen; 7, fossa navicularis; 8, bulbi vestibuli; 9, sphincter vaginæ.

8. The vulvo-vaginal glands (Bartholin's or Cowper's glands) are two in number. They are situated in the postero-lateral portion of the vagina, in the triangular space formed by the rectum and vagina, and in the space separating these organs from the ascending ramus of the ischium, about 1 ctm. ( $\frac{2}{3}$  in.) from the bottom of the genito-crural fold. They vary in size in different individuals and are made up of lobes, lobules, and acini. Each has an excretory canal opening at the angle of junction of the *carunculæ myrtiliformes* with vulvar opening, which opening is covered over by a sickle-shaped fold of mucous membrane. They secrete a limpid fluid which flows upon stimulation of venereal excitement [and when the head is on perineum.—ED.]. The secreting apparatus of the vulva is completed by the muciparous follicles, which are indiscriminately grouped about the meatus and lateral portions of the entrance into the vagina.

§ 2. THE MAMMARY GLANDS.—The mammae are glandular organs connected with the generative apparatus, for the secretion of milk. Two in number, they are situated at the anterior and upper part of the chest, alongside of the median line. Slightly elevated before puberty, they en-

large at the first appearance of the menses, and increase still more during pregnancy. They atrophy in old age. Their size also depends somewhat on the amount of fat which they contain.

The mammæ are in the form of hemispheres, each surmounted by a large papilla, "the teat" or nipple. The skin over them is white and delicate. The nipple is uneven, cylindrical, or conoid in shape, and surrounded by an *areola*, rosy in virgins, but brownish in the majority of women who have borne children. In women with red hair, however, pigment seems to be absent.

*Structure.*—The mammæ are made up of two kinds of tissue, glandular and fatty.

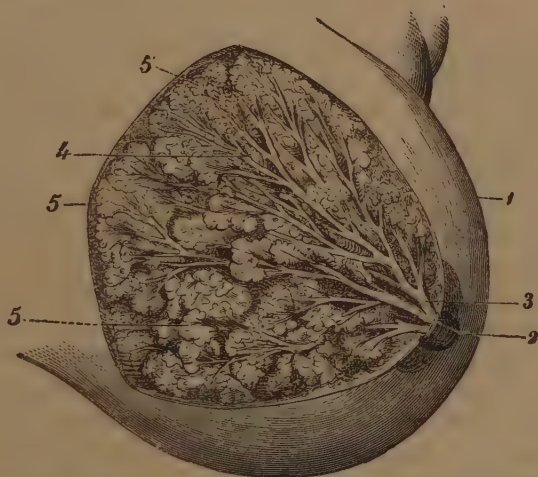


FIG. 17.—Mammary Gland. 1, Cutaneous envelope; 2, nipple and areola; 3, ampullæ and galactophorous ducts; 4, canaliculi of a lobule; 5, lobules.

1. The mammary glandular apparatus, flattened from before backward and thicker centrally than peripherally, is made up of an agglomeration of glandular vesicles, united to form lobules, from each of which runs an excretory duct, whitish in color, into which empty radicals emerging out of the ultimate glandular vesicles. All the excretory canals or galactophorous ducts converge toward the centre, forming ampullæ or reservoirs at the level of the nipple, and finally, to the number of ten or fifteen, empty into the apex of the nipple. The lobules are all united together by a firm fibrous stroma.

2. *Adipose Tissue.*—The spaces left by the lobules at the external portions of the mammæ are filled with fat, which gives the glands their volume. The breasts receive a large number of both superficial and deep vessels, and nerves. The vessels can often be seen, on account of the transparency of the skin, and generally indicate that the woman will be a good nurse, since physiology teaches that secretion is directly related to circulation, "*Ubi stimulus, ibi fluxus.*"



## ART. II.—INTERNAL ORGANS.

§ 1. THE VAGINA.—The vagina is a membranous canal extending from the vulva to the uterus.

It is situated in the true pelvis, between the bladder and rectum. Below, its direction is obliquely up and back, *i.e.*, the same as that of the axis of the anterior plane of the inferior strait; higher up it forms an elbow-joint with the uterus, and approximates to the axis of the pelvis. It has the form of a cylinder flattened from before backward, and having contiguous walls. It is very variable in length (9 to 10 ctm.,  $3\frac{1}{2}$  to 4 in.); the anterior is always shorter than the posterior wall, on account of its being curved up under the pubis. Pregnancy and pathological lesions induce variations in its length.

The vagina presents an external surface, two lateral faces, an internal surface, and two extremities.

The *external surface*, slightly concave anteriorly, but convex posteriorly, is in relation with the urethra and *bas fond* of the bladder in front, the rectum behind, and from the latter it is only separated in its upper fourth by a fold of peritoneum.

The *lateral faces* give attachment above to the broad ligaments, and below they are in relation to the cellular tissue and vessels of the pelvis.

The *internal surface* is lined by mucous membrane, presenting transverse ridges, best marked and most numerous toward the orifice of the vulva. These ridges all start from a median raphé—Haller's column—which is more projecting upon the anterior than upon the posterior wall. These folds, compared with those seen in the mouth of puppies, allow the vagina to elongate during pregnancy and to enlarge during delivery. They diminish with succeeding deliveries, whence it is concluded that they are not papillæ, as has been thought.

The *superior extremity* of the vagina surrounds the neck of the uterus, forming about it a circular depression deeper behind than in front; these are the anterior and posterior *culs-de-sac* of the vagina.

The *inferior extremity* is constricted and well-nigh closed in virgins by the hymen; it ends at the orifice of the vulva.

*Structure*.—The vagina is made up of an external fibro-cellular layer, a middle muscular layer, and an internal mucous layer covered with pavement epithelium. The external or fibro-cellular layer is of a whitish color, thinner above than below, and completely surrounds the vagina. The histological elements composing it are: (1) a connective tissue which is densest externally, and (2) a large number of elastic fibres which permit its expansion. The middle layer is made up of two layers of muscular fibre, an external longitudinal and an internal set running transversely or circularly. This yellowish layer is intimately adherent to the internal

surface of the fibro-cellular coat. The histological elements are fibrillæ, whose characteristics are best marked during pregnancy. The internal mucous layer, besides its bright red color and rugæ (already referred to), shows, microscopically, numerous glandular follicles for secretion of the vaginal mucus. Vessels and nerves come from the hypogastric vascular trunks and nerve-plexuses.

The *vaginal bulbs* (bulbi vestibuli) are two erectile organs situated in the lateral and anterior portions of the vaginal orifice, and having a structure analogous to the corpora cavernosa (see Fig. 16).

§ 2. THE UTERUS.—The uterus, or womb, is the organ of gestation, destined to receive and contain the fecundated ovum and to expel it at full term.

The uterus will first be considered when empty: in another chapter the modifications due to pregnancy will be described.

*Situation.*—The uterus is situated in the true pelvis, between the bladder and rectum, above the vagina, and below the intestinal folds which cover it, above and in front are the rounded ligaments; above and laterally, the broad ligaments; directly in front the anterior ligaments; and behind, the posterior ligaments; below it joins on to the vagina. The laxity of these ligaments permits of motion, and hence sometimes arise changes in position and shape.

*Direction.*—The uterus is directed downward and backward (with the axis of the superior strait). It forms an obtuse angle with the vagina, so that the anterior lip is lower than the posterior—a normal ante flexion.

*Volume and Weight.*—These should be studied both in those who have not and those who have had children.

In the adult nullipara it is 7 to 8 ctm. ( $2\frac{3}{4}$  to  $3\frac{1}{4}$  in.) long,  $3\frac{1}{2}$  to 4 ctm. ( $1\frac{3}{8}$  to  $1\frac{5}{8}$  in.) broad at the fundus, and  $1\frac{1}{2}$  ctm. ( $\frac{3}{8}$  in.) in all directions at the neck. The walls are  $1\frac{1}{2}$  ctm. ( $\frac{3}{8}$  in.) thick. It weighs from 24 to 40 grammes ( $\frac{4}{5}$  to  $1\frac{3}{5}$  oz.).

In multipara it is 9 to 10 ctm. ( $3\frac{1}{2}$  to 4 in.) long,  $5\frac{1}{2}$  to 6 ctm. ( $2\frac{1}{5}$  to  $2\frac{3}{5}$  in.) wide at the base, and  $4\frac{1}{2}$  ctm. ( $1\frac{3}{4}$  in.) at the cervix. The walls are two ctm. ( $\frac{3}{4}$  in.) thick. It weighs from 48 to 60 grammes ( $1\frac{7}{10}$  to  $2\frac{1}{10}$  oz.).

In old age the uterus atrophies, so that it may only weigh 4 to 8 grammes ( $\frac{1}{4}$  to  $\frac{3}{4}$  oz.).

*Form.*—The womb is pyriform or conoid, with its base uppermost, flattened from before backward, slightly constricted at the junction of cervix and body, where it forms the *isthmus of the uterus*. It presents an external and an internal surface. The cervix is cylindrical and is very distinct from the body.



## A.—EXTERNAL SURFACE OF THE UTERUS.

This presents two faces, two borders, a base, an apex, and ligaments.

1. *Anterior Surface*.—This is slightly convex and covered with peritoneum on its upper three-fourths; it is in relation with the posterior surface of the bladder, with which it is in intimate contact for 14 to 15 mm. ( $\frac{1}{2}$  to  $\frac{3}{8}$  in.).

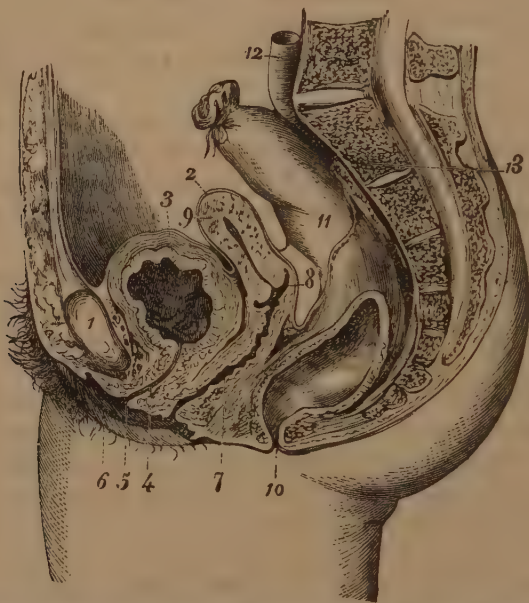


FIG. 18.—Section of Pelvis, showing Relation of Pelvic Organs. 1, Pubis; 2, peritoneal layer of uterus; 3, bladder; 4, urethra; 5, meatus; 6, labia majora; 7, vagina; 8, os tincæ; 9, tissue of uterus; 10, anus; 11, rectum; 12, aorta; 13, sacrum.

2. *Posterior Surface*.—This is much more convex than the former. It is in relation with the anterior surface of the rectum, from which it is separated by peritoneum throughout its entire extent.

3. *Borders*.—The two lateral borders are slightly concave, and give attachment to the broad ligaments.

4. The *base* or *fundus* is convex and looks up and forward. It is covered by peritoneum and intestines, not reaching the sacro-vertebral angle. In women who have borne children the concavity of the borders disappears and they tend to become convex. The convexity of the fundus becomes much greater and is raised very palpably above the level of the insertion of the Fallopian tubes. This does not occur in nullipara.

5. The *apex* or *cervix* looks down and back, and forms a projection into the vagina. That portion of the cervix inaccessible to the finger is called

the *supra-vaginal portion*; that below the insertion of the vagina into the womb is the *sub-vaginal portion*. It is covered by the mucous membrane continuous with that which lines the organ. The cervix is divided by a transverse slit into two lips, a larger (anterior), and a smaller (posterior). The orifice is called the *os cervicis*, *os tincæ* ("the tench's snout"). In *primiparæ* the cervix is 3 to 3½ ctm. long (1¼ to 1¾ in.), conical, the apex being directed downward, traversed by an almost circular canal, smooth, and without notches. The orifice is difficult to recognize by palpation, and feels like the little depression between the cartilages at the tip of the nose. (Dubois.)

In *multiparæ* its free extremity is larger and shorter in proportion to the number of children the woman has borne. After five or six deliveries it is often reduced to a stump, divided by a transverse slit, or expanded

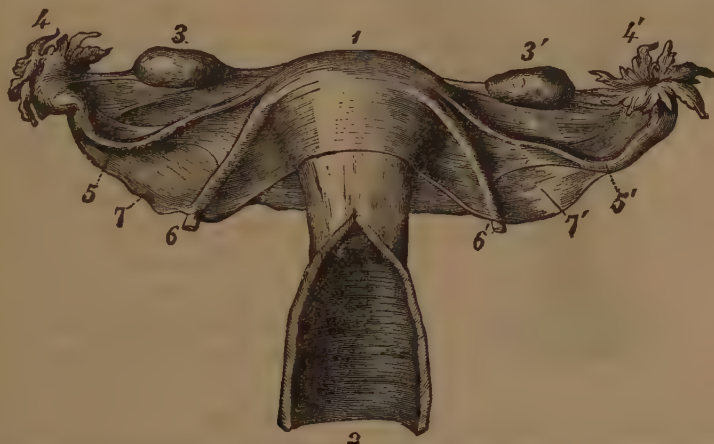


FIG. 19.—Uterus, Tubes, and Ovaries. 1, Uterus; 2, vagina; 3, 3', ovaries; 4, 4', pavilion or frimbriated extremity of 5, 5', the Fallopian tubes; 6, 6', round ligaments; 7, 7', broad ligaments.

("bell-mouthed") opening, fissured, especially at the left, on account of the foetal head tearing the cervix in anterior presentations. The *culs-de-sac* of the vagina are more or less obliterated.

6. *Ligaments*.—The uterus is held by anterior or vesico-uterine ligaments, formed by folds of peritoneum; by posterior or recto-uterine ligaments, also folds of peritoneum; by broad ligaments, made up of transverse prolongations of peritoneum from the sides of the uterus, and divided into three folds, which contain (behind) the ovaries and their ligaments, (in front) the round ligament, and (in the centre of the three folds) the Fallopian tubes; and finally, by the round ligaments arising above from the sides of the uterus and running toward the vaginal canal, which they enter to become lost as digitations within the substance of the labia majora. The right round ligament is shorter and thicker than the left.

## B.—INTERNAL SURFACE OF THE UTERUS.

The cavity of the uterus is very small compared with the volume of that organ, and it is different in the body and in the cervix.

The *cavity of the body* is triangular in form, each angle being pierced by an opening; one inferior—the os internum—and two others, scarcely perceptible, at the superior angles—the openings of the tubes.

The surfaces and borders of this cavity vary according as the woman has, or has not, borne children.

In nulliparæ the surfaces are flat and almost contiguous, and the three borders are convex, projecting into the interior; while in multiparæ the faces are separated and concave, the three borders being equally concave from the centre.

The *cavity of the cervix* in nulliparæ is a little shorter than that of the body; it is fusiform, flattened from before backward, terminated above by the cervico-uterine orifice, and below by the os tinæ. The latter often being open in multiparæ, the cavity of the cervix is shaped like a candle-extinguisher.

Its posterior face shows ridges and rugæ arranged like a palm.

This is less marked anteriorly. It is called the *arbor vitæ cervicis*. According to Guyon the stem of the tree runs to the left a few millimetres from the os tinæ on the posterior surface; while the anterior stem is turned to the right, so that the surfaces may fit into each other.



FIG. 20.—Section of Uterus. 1, Cavity of body; 2, 2', superior angles; 2', orifice of left tube; 3, cavity of cervix, *arbor vitæ*; 4, mucous membrane; 5, vagina.

## C.—STRUCTURE OF THE WOMB.

The uterus is composed of an external peritoneal covering, its parenchyma, an internal mucous coat, and of vessels and nerves.

1. The *external, serous* membrane is formed by peritoneum, which, after being reflected from the bladder upon the upper three-fourths of the anterior surface, covers the fundus and the posterior surface, then extending on to the rectum. The transverse prolongation of this coat constitutes the broad ligament.

2. The *essential tissue* or *parenchyma* of the uterus is grayish, dense,

creaking under the cut of the scalpel, and made up of fibres inextricable when the organ is empty, but easily followed and separated in the gravid uterus. Kölliker describes short and fusiform fibrillæ with oval nuclei united together by firm connective tissue. This tissue is essentially muscular.

3. The internal or mucous surface is merely a continuation of that of the vagina. It is very thick at the centre of the organ, and, on account of its *falling* off after menstruation and labor, the name *decidua* has been given it. It contains numerous tubular follicles whose secretion continually lubricates the interior of the womb. In the cervix these glands are more rounded, and sometimes distended with mucus; they are called here the glands of Naboth.

The epithelium is ciliated, but it becomes pavement during pregnancy, except in the cervix. The anatomical elements composing it are: (1) an interlacing connective tissue of elastic fibres; and (2) the tubular follicles just named, and which appear, microscopically, dilated in the form of ampullæ, whence arise sinuous canals which open in the interior of the cavity of the body of the uterus and cervix. Each follicle is amorphous, and lined with cylindroid epithelium.

According to the recent researches of De Sinéty the secretion of the glands of the body of the uterus does not resemble mucus, while that in the cervix does. Hence any mucus found in the body of the womb is the result of reflex from the cervix.

4. The *arteries* come from ovarian and hypogastric trunks. The latter supply the middle and lower part of the organ; the former the upper portions. All these vessels pierce the womb through its lateral borders, between the two folds of the broad ligament. There they break up into numerous branches, entering the substance of the organ and terminating in a rich capillary plexus spreading over the mucous surface. The *veins* are numerous and form true plexuses, emptying into corresponding venous trunks. The *lymphatics* run to the pelvic and lumbar glands. The study of these vessels and their glands has been recently enlightened by J. Lucas-Championnière, and still later by Léopold (*Arch. für Gynækol.*, 6th ed., September 1, 1873). We refer the reader to these authors, on account of the important rôle played by the lymphatics in puerperal diseases.

5. The *nerves* are derived from two sources—those of the cervix from the sacral plexus, and those of the body from the great sympathetic. The latter circumstance explains why uterine contractions do not cease under the influence of chloroform.

§ 3. THE FALLOPIAN TUBES.—The Fallopian tubes, oviducts, or “uterine trumpets,” are two membranous canals, floating in the true pelvis and contained in the broad ligaments. They run transversely out to the ovaries, to which they are joined by a little ligament. They are 11 to 13 ctm. ( $4\frac{1}{3}$  to  $5\frac{1}{10}$  in.) long. Their diameter increases as they run from the womb,



and their free end is dilated and surrounded by fimbriæ; it is called the tuba, trumpet-shaped extremity, or pavilion, and is for grasping the ovary. A narrow canal runs through the tubes, the internal opening of which is at the superior angle of the uterine cavity.

*Function.*—The tubes serve to transmit the fecundating material to the ovaries and to carry the ovum into the uterine cavity.

*Structure.*—They are formed of an external peritoneal covering, of an internal mucous surface, and of an intermediate proper muscular tissue, arranged in two layers: (1) the longitudinal seems to be a prolongation from the uterus; (2) the circular, peculiar to the tubes alone, ends as a kind of sphincter upon the abdominal orifice. The mucous membrane is lined by cylindrical epithelium, whose cilia move toward the womb. Numerous fusiform cells are found in an incompletely developed connective tissue.

The arteries arise from the utero-ovarian trunk, entering the substance of the tube at its lower border. The veins empty into corresponding vessels. The nerves come from the hypogastric and ovarian plexuses.

§ 4. THE OVARIES.—The ovaries are two ovoid bodies, whitish in color, each about the size of an almond, flattened from before backward, and with a corrugated surface. Situated on either side of the uterus, they are encased in the posterior leaflet of the broad ligament, where they have

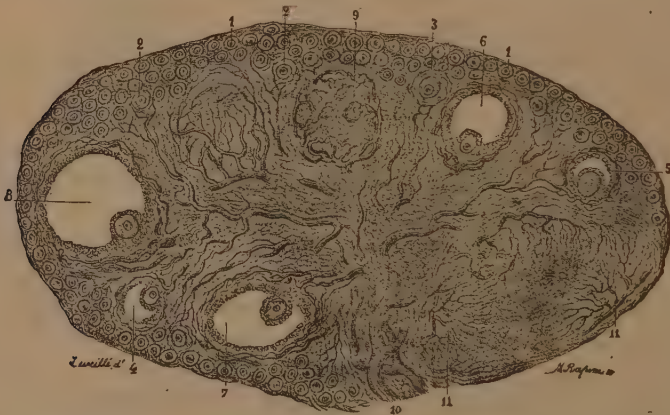


FIG. 21.—Longitudinal Section of a Cat's Ovary (Otto Schreine). 1, Rudimentary follicles scattered in great numbers in the cortical layer, deprived of vessels; 2, same in a more advanced state, granular elements appear and vessels begin to surround them; 3, granular elements no longer fill the follicles, but commence to form a membrane upon their walls; 4, 5, 6, 7, 8, follicles more and more advanced, several have reached maturity (it must be remembered that the cat bears several kittens, and therefore several follicles should be found simultaneously matured); 9, complete follicle, a section of which shows elements of the ovum; 10, large vessels of the ovary, whose ramifications are clearly seen in the midst of the parenchyma; 11, vascular loops surrounding and limiting a corpus luteum.

great freedom of motion. But they are held, at the uterine side, by a special ligament (utero-ovarian), formed by the expansion of the muscular fibres of the womb; and at their external extremity they are adherent to one of the fringes of the trumpet-shaped end of the tubes. They are



very small in infancy, but increase at puberty, and especially at the menstrual epochs. They measure, on the average, 3 to 4 ctm. ( $1\frac{1}{5}$  to  $1\frac{3}{5}$  in.) longitudinally, 2 ctm. ( $\frac{3}{4}$  in.) vertically, and  $1\frac{1}{2}$  ctm. ( $\frac{1}{2}$  in.), antero-posteriorly. Dr. A. Puech, of Nîmes, to whom science is debtor for brilliant investigations made concerning these organs, states that the right ovary is a little larger than the left.

Physiologists are not agreed as to the influence of gestation upon the volume of the ovary; while some, with Cruveilhier, say that the ovaries increase in volume during the whole time of pregnancy; the author just cited, with many anatomists, believes in a diminution in their size in the latter months of gestation.

The ovaries often present anomalies during the child-bearing period (A. Puech). They gradually atrophy in old age.

While the uterus is destined to receive and expel the ovum, the ovary, which produces the latter, plays a still more important part in animal reproduction.

*Structure.*—The ovary is covered by an epithelial layer from the peritoneum, beneath which is the cortical (or generative) layer, whose special function is the secretion of ova in this cortical layer, in considerable number, even in intra-uterine life. At the centre is the medullary portion, to which we shall refer later. Until 1863 the ovary was thought to be formed of a fibrous areolar tissue or stroma, at whose surface existed—at the time of puberty—little vesicles (*Graafian vesicles*), measuring 1 to 2 mm. ( $\frac{1}{12}$  to  $\frac{1}{8}$  in.) in diameter. The latter, to the number of fifteen or twenty, are visible to the naked eye, and each contains an ovum  $\frac{1}{4}$  of a mm. ( $\frac{1}{100}$  in.) in diameter. But, as we have said, these are not the only ones found; the ovary contains an immense quantity of them, and they form, after a fashion, part of the sub-epithelial or cortical layer, which, with the medullary portion, replaces the “stroma” of former times.

The medullary portion constitutes the body of the gland: its color is red. It is made up of vessels and muscular fibres, some peculiar to it, others coming from the ovarian ligament, from the tubes, and from the round ligament. Remains of corpora lutea are sometimes seen.

The cortical portion is whiter than the medullary, of a uniform thickness, and made up of muscular and connective tissue fibres, vessels, nerves, and especially of Graafian vesicles, which make their appearance as early as the third month of foetal life. (Schroene, Sappey.)

The Graafian follicles are formed of two membranes—the external is very vascular, and the internal has a velvety epithelium. The ovum occupies but a very small part of the cavity of the follicle, which is filled with an albuminous, straw-colored fluid, which contains small granules grouped about the ovum. The latter is made up of a thin covering, the vitelline membrane or chorion, holding a whitish fluid, the vitellus, in which is a small cell, the *germinal vesicle of Purkinje*, the investigator who first dis-

covered it. This little vesicle contains an albuminous fluid, and an aggregation of granules called *the germinal spot of Wagner*.

The germinal vesicle furnishes the elements of the embryo: the ovary usually exhibits at its surface a brownish-yellow, firm tubercle, which has received the name of *corpus luteum*, which is due to rupture at each menstrual epoch of some of the Graafian follicles which have undergone enlargement.



FIG. 22.—Vessels of a Graafian Follicle. 1, Vitelline membrane; 2, membrana granulosa; 3, wall of the vesicle; 4, its vessels; 5, stroma of ovary; 6, cavity of the vesicle; 7, peritoneal layer.

This rupture is accompanied by a slight extravasation of blood whose coloring matter gradually disappears while the fibrin organizes to form a more or less prominent cicatrix. After the corpus luteum disappears, the cicatrix yet remains, and traces of these are found in ovaries of adult females for a long time.

The ovaries and the ova are for the reproduction of the species: their absence induces irreparable sterility, which cannot, however, be diagnosed during life.

### ART. III.—MENSTRUATION, OR COURSES.

Such are the names given to a periodical bloody discharge, which has its exit through the vagina and which occurs in girls from the time of puberty until the menopause, or change of life. In our climate the catamenia appear about the twelfth or fifteenth year, ceasing between the fortieth or fiftieth year; appearing earlier in torrid, and later in cold climates.

With puberty there is a rapid development of the genitals. The breasts become rounded and elevated, and the first flow of menstrual blood is preceded by general malaise, flashes of heat, vertigo, sudden lassitude, a feeling of weight in the head, and a slight change in the color of the face. Then occur vague pains in the loins and thighs, sometimes painful twinges in the hypogastrium; there are dark circles around the eyes and frequently a high degree of nervous susceptibility.

The first few times the flow is irregular, but later it returns periodically each month, lasting from two to eight days, accompanied by a loss of blood, varying from 90 to 500 grammes.

Thin, nervous women generally flow more abundantly than the stout and plethoric, or than those who lead a very active life.

Menstruation is usually absent during pregnancy and lactation. The

period when it finally ceases is preceded by progressive diminution in the quantity of blood lost and by irregularities regarding time of the appearance of the flow. This epoch, wrongly considered as a time of great restlessness, is called the critical period, menopause, or change of life. because it is thought that woman is liable to many diseases, *e.g.*, organic affections of the womb, congestion of the viscera, degeneration of the mammae, etc. Its time of occurrence is uncertain, occurring sooner or later according to the early or late appearance of the first menstruation. [We think no such rule holds good.—Ed.]

The source of the flow is evidently the uterus. The blood clearly exudes through minute microscopic chinks of the mucous membrane, which is markedly tumefied at these periods. This oozing coincides with the phenomena of the rupture of a Graafian follicle. Menstruation is often anomalous; it may be replaced

by bleedings from lungs, stomach, wounds, or sores, or by epistaxis. Under the name of uterine epistaxis is included a uterine hemorrhage without any attendant ovarian phenomena.

Menstruation is proof positive of puberty. Hemorrhages occurring in little girls from early infancy, although from the genitals, must not be considered as catamenia. On the other hand, women pass through pregnancy without ever having ceased menstruating.

*Fecundity* is the power to conceive, it presupposes intact and well-formed genitals.

*Sterility* is powerlessness to conceive, its causes are numerous and often escape our observation. Thus it may arise from obstruction in the oviducts, morbid states of the ovaries, their abnormal adherence to neighboring parts, ovarian displacements, deviations in the uterine canal, obliteration of its cavity, of its cervix, or of the vagina, absence of any of these parts, etc.

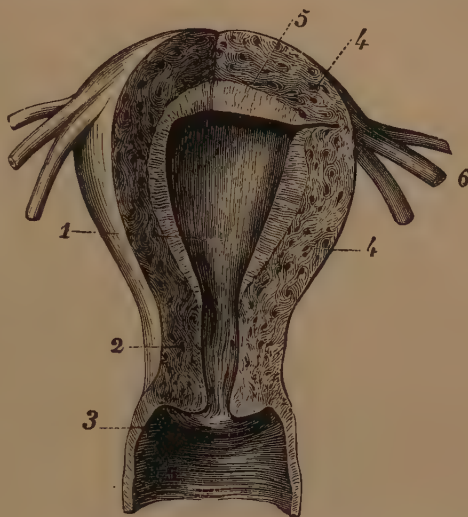


FIG. 23.—Section of Uterus during Menses. 1, Cavity of uterus; 2, 4, muscular tissue and vascular orifices; 3, vagina; 5, tumefied mucous membrane; 6, tubes and ligaments.



## Part 2.

### PREGNANCY—PHYSIOLOGICAL CHANGES.

#### CHAPTER I.

##### GENERATION—CONCEPTION.

GENERATION in the human species is effected by the congress of the two sexes; this act constituting *copulation*. It results in the procreation of a new being, through the contact of the male fructifying principle (spermatozoa) with the germ furnished by the female (ovule): this constitutes *conception* or *fecundation*.

The point of contact of the male and female elements may be in the ovary; this ancient notion, being justified by abdominal and ovarian pregnancies, should no longer be doubted (A. Puech); it may also occur in the tubes—a fact evidenced by tubal or interstitial pregnancies; moreover, the trumpet-shaped end of the tube conducts the ovule thither; finally, impregnation may be effected within the uterine cavity itself. One fact, however, is incontestable—that the ovula, after it has once passed from the ovary, may become fecundated at any point within the genital tract where it meets the spermatozoa, and that this is more likely to be the case near the ovary, or in the first portion of its course, on account of the rapid alterations it undergoes when it has not been fecundated. (Coste.)

As to the influence which the male fructifying principle may have on that of the female, and *vice versa*, that is a mystery for the explanation of which nothing but hypotheses will, for a long time, be available. We do know, however, that the ovule, whether fecundated or not, is seized by the fimbriated extremity of the tube, which adapts itself to the ovary by a sort of erection at the moment the vesicle ruptures, and that it is conducted to the uterus where it is to develop if fecundated, or where it disappears by deliquescence or absorption after a variable time (eight to eleven days) if fructification has not taken place.



## CHAPTER II.

### GESTATION.

GESTATION, or *pregnancy*, is the condition in which the woman finds herself from the moment of conception until the time of the expulsion of the ovum. Its duration is two hundred and seventy days, or nine full months. It may, however, terminate earlier, but rarely later.

Pregnancy is divided, according to the place the ovum occupies, into, first, *uterine* ; second, *extra-uterine*.

1. Uterine pregnancy will be *single*, *twin*, or *multiple*, according to the presence of one, two, or several fœtuses. The latter is observed chiefly where poverty is marked, as in Ireland and Poland. A *complicated* pregnancy is one which acts as a pathological new growth within the abdomen.

2. Extra-uterine pregnancy may be *ovarian*, *abdominal*, *tubal*, or *interstitial*, according to the point of nidation of the ovum.

There are instances of *mixed* pregnancies.

*Molar* or *vesicular* pregnancies are uterine pregnancies, their course having been arrested and the product of which has degenerated.

Finally, what are termed *false pregnancies* are merely peculiar states with which the uterus may have nothing to do (fatty pregnancy), or in which it may be distended by gas (nervous pregnancy), or finally a disease may be present which simulates and leads to the belief in a pregnancy which does not exist. Strictly speaking, therefore, there are no false pregnancies. The woman is either pregnant or she is not pregnant (Pajot).

#### ARTICLE I.—SINGLE UTERINE PREGNANCY.

Single uterine pregnancy is one in which there is only a single product of conception present in the uterus.

It comprises, as does also multiple uterine pregnancy, two series of coincident phenomena :

A. Modifications supervening in the woman.

B. Phenomena manifesting themselves in the product of conception.

We shall devote a special chapter to the second series of phenomena.

## MODIFICATIONS SUPERVENING IN THE WOMAN.

§ 1. CHANGES IN THE BODY OF THE UTERUS.—*Volume*.—Conception augments the vital properties of the uterus; the afflux of blood to it enlarges the walls, and its cavity dilates. The mucous membrane hypertrophies even before the descent of the ovum, and forms the decidua which lines the entire internal surface of the organ. When the ovum arrives in the uterus, it brings a new life with it; the organ develops still further, and its volume increases steadily. Thus, in a woman who has never borne children, the height of the empty uterus being 7 ctm. ( $2\frac{3}{4}$  in.), toward the third month of gestation it will measure 85 mm. ( $3\frac{3}{8}$  in.); at four months, 10 ctm. (4 in.); at six months, 22 ctm. ( $8\frac{3}{4}$  in.), and at full term, 35 to 38 ctm. (14 to  $15\frac{1}{4}$  in.). All the other dimensions increase in proportion.

*Form*.—Flattened upon both surfaces and triangular in form, the uterus at the commencement of pregnancy becomes rounded, then it elongates, and finally assumes an ovoid shape.

*Situation*.—In the first three months of conception the uterus seems to sink more in the lesser pelvis, on account of the sacro-vertebral angle, which it clears with difficulty. But at the end of the third month the uterus reaches the superior strait, and at the end of the fourth month it is from three to four fingers' breadth above this point.

At five months it can be felt one finger's breadth below the umbilicus, and at six months it is  $1\frac{1}{2}$  ctm. ( $\frac{3}{8}$  in.) above it. At seven months it is three fingers' breadth above this point; at eight months it is four to five fingers' breadth distant from it, and it reaches the epigastric region in the ninth month and remains stationary until the last fortnight, at which time it almost always sinks. The fact must not be lost sight of that the umbilicus does not always occupy a fixed position in all women, and that consequently it would be better to take the upper border of the pubis for the starting-point in measuring.

*Direction*.—Being repulsed by the vertebral column, and especially by the sacro-vertebral angle, but meeting with no resistance toward the abdominal walls, the fundus uteri inclines forward and, most frequently, toward the right side. This right lateral obliquity is attributed by Boivin to the fact that the round ligament of that side is shorter, thicker, and contains more muscular fibres than that of the left side.

*Thickness of the Walls*.—In the first three months a slight thickening of the uterine walls occurs, due to the great development of the vascular apparatus.

Toward the fifth month these parts have resumed their normal state; at term they are thickest at the level of the placental insertion, more attenuated toward the cervix, yet presenting but little difference in the remaining portions.

*Density of the Walls.*—Though very hard, very resistant, and almost fibrous when empty, the uterine walls become flaccid, and soften during gestation.

*Ascending Movement.*—Joulin has called attention to this remarkable phenomenon, which is accomplished contrary to the laws of gravity, without there being any anatomical reason to explain it. This author believes that the horizontal decubitus of the woman at night favors the ascent of the uterus.

§ 2. CHANGES IN THE CERVIX UTERI.—Along with the body of the uterus the cervix changes during pregnancy in consistence, in volume, in form, in situation, and in direction:

*Consistence.*—From the time of conception the consistence of the cervix diminishes. Toward the end of the first month the softening reaches to the surface of the os tincæ, which appears tumid; in the third and fourth months it has already a depth of 2 mm. ( $\frac{1}{12}$  in.), and at six months it takes up one-half of the infra-vaginal portion of the cervix.

During the last three months the softening gradually invades the superior portion, and finally the internal os at term. This softening is very much slower in primiparæ, but likewise always extends from below upward.

*Volume.*—In becoming softer the cervix grows in volume without varying in length; but toward the last two weeks of pregnancy the fluid secreted from its internal surface infiltrates the walls, expands the middle portion, and thus approximates the two orifices of the cervix, which, in this way, necessarily becomes shorter.

*Form.*—In primiparæ the cervix is more pointed at first; subsequently the external os becomes rounded and remains closed until the end of gestation; its centre widens, it becomes fusiform, remains smooth, and exhibits no unevenness on its lips.

In multiparæ, the cervix is irregular, nodular, and funnel-shaped. Toward the ninth month the entire tip of the finger can be carried as far as the internal os, which remains closed. Somewhat later this ring softens, and the finger can reach the membranes, through a canal measuring from 27 to 40 mm. (from 1 to  $1\frac{3}{8}$  in.). Wieland thought that the differences presented by the permeability of the cervix in primiparæ and multiparæ were theoretical rather than practical. We hold, with Professor Pajot, that they actually exist.

During the last few days the cervix is rapidly obliterated and merges with the uterine cavity, under the influence of contractions which precede labor, as well as through the engagement of the fœtus. [There is good authority for the belief that, in the majority of instances, the internal os undergoes no change, except that of slight dilatation, until the advent of labor.—Ed.]

*Situation and Direction.*—During the first three months the cervix is

readily reached ; it is directed forward and to the left. Subsequently it follows the uterus in its ascent and most frequently is directed backward and to the left, the reverse of the body of the organ, which deviates to the right and forward.

§ 3. CHANGES IN TEXTURE AND NEW PROPERTIES OF THE UTERUS.—These changes are appreciable in the various elements entering into the structure of the uterus. A knowledge of them is so important, that one can understand the physiological and mechanical phenomena of parturition, as well as the production and the arrest of hemorrhages.

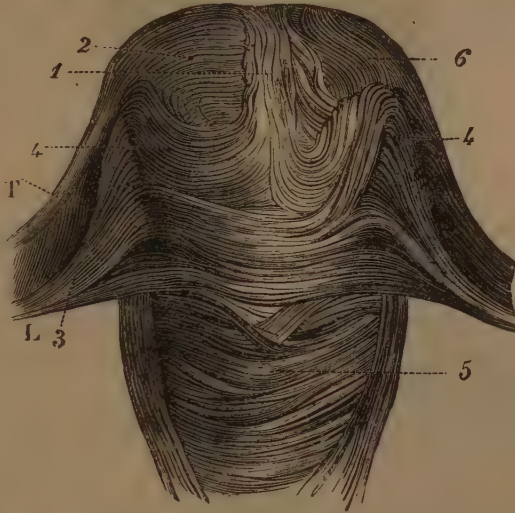


FIG. 24.—Anterior Surface of the Uterus, Superficial Layer. L, Round ligament; T, Tube; 1, middle layer; 2, transverse fibres; 3, fibres of the round ligament which have spread over the anterior surface of the uterus; 4, fibres arising from the posterior portion of the round ligament which form loose folds before they join the median fasciculus; 5, fibres of the cervix uteri; 6, oblique fibres.

*External or Serous Membrane.*—It becomes the seat of a more active nutrition, which favors its extension without attenuating it and without diminishing its resisting power. Besides, beneath the peritoneum, we find a thin fibrous layer which is more resistant on the anterior than the posterior surface (Hélie). Boivin and Dugès had already noticed this sub-peritoneal membrane and compared it to Glisson's capsule of the liver.

*Internal or Mucous Membrane.*—This membrane becomes both richer in vessels and more villous ; its mucous follicles enlarge and their secretion is considerably increased.

*Stroma.*—The characteristics of this tissue, imperceptible in the empty state of the organ, disclose themselves during gestation. This latter condition allows its essentially muscular nature to be recognized, while at the same time it permits us to follow with the scalpel the arrangement of the intrinsic fibres of the organ, which is seen to form three layers : a first, thin,



external layer composed of parallel fibres, transverse or slightly oblique toward the tubes, the ovary, and the round ligament; it interlaces at the

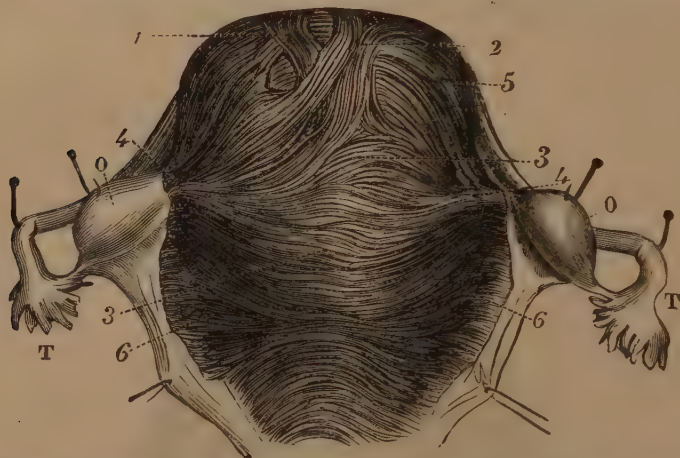


FIG. 25.—Superficial Layer of the Posterior Surface of the Uterus. O, Ovary; T, tube; 1, left branch of the median fasciculus; 2, right branch; 3, 4, transverse fibres; 5, oblique fibres; 6, interlacing of the fibres of the posterior and anterior surfaces.



FIG. 26.—Internal Surface, Superficial Layer of the Anterior Wall. 1, Uterine wall; 2, infundibulum of the tubes; 3, triangular fasciculus; 4, arcuate fibres of the vault; 5, interlacing of these fibres which extend beneath the triangular fasciculus; 6, orifice of sinuses; 7, portion of the posterior triangular fasciculus lifted up; 8, cervical fibres; 9, transverse fibres; 10, oblique fibres.

centre to form a raphé; this median fasciculus always descends lower behind than in front. A second, internal, thicker layer, consisting of muscular fibres, which starts from the median line and terminates conically toward the orifice of the tubes; on the internal walls there exists a double triangular fasciculus, slightly prominent, the constant presence of which has been demonstrated by Hélie (of Nantes). Lastly, the third, or median layer, successively admitted and rejected, has been described with precision by Hélie; it is composed of interlacing fibres forming encircling loops or rings around the vessels. This median layer is especially visible at the point of insertion of the



placenta. In the cervix there are only circular fibres in the form of a sphincter.

*Vascular Apparatus.*—The uterus is the seat of an increased nutrition. The arteries supplying it with blood dilate and give off numerous ramifications, some of which penetrate it so as to terminate on its internal surface; others, those at the level of the placenta, dip into the inter-utero-placental tissue and traverse even the cotyledons, until they reach the foetal surface of the placenta.



FIG. 27.—Deep Section of the Internal Layer. 1, Infundibulum of the tubea; 2, vertical fibres proceeding from the fundus uteri; 3, arcuate fibres; 4, uterine sinuses; 5, oblique fibres; 6, cervical fibres.

The veins and lymphatics equally increase in volume.

*Nerves.*—During pregnancy the nerves of the uterus participate in the general hypertrophy of the parts entering into the structure of this organ. They manifest their presence by large nervous bands beneath the peritoneum. They proceed from two sources: first, from the nerves of organic life for the body of the uterus; second, from those of the cerebro-spinal system for the cervix.

*Extrinsic Fibres.*—The gravid uterus is not limited to the muscular elements which we have just described. Indeed, Professor Rouget has demonstrated fibres radiating around the organ, not only in the Fallopian tubes,

as we have seen above, but also in the round ligaments and deep within the broad ligaments.

*Properties of the Uterine Tissue during Pregnancy.*—All the properties of which we are about to speak exist in a rudimentary state in the *non-pregnant* female; gestation merely causes their development, and, as Professor Pajot says, it does not create a single new property; there is, in the first place, the *organic contractility* by which the uterus tends to expel the body it encloses. This faculty is accompanied by pains which are more or less intensely felt, according to the individual; it is independent of volition and is liable to be exhausted by a prolonged labor. In like manner it may be induced by exercise and excitants, and diminished or even suspended by opiates.

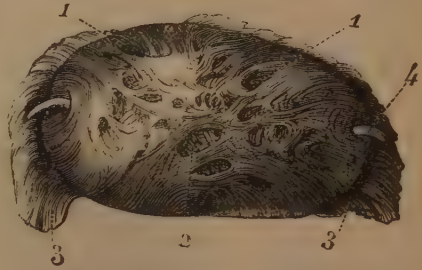


FIG. 28.—Median Layer at the Level of the Placental Insertion. The interlacing fasciculi form encircling loops or rings around the vessels. 1, Sinus; 2, fasciculus belonging to the internal layer; 3, superficial layer dissected; 4, tube.

There is, furthermore, the *contractility of the tissue*, which is the tendency of the uterus to resume its former dimensions after the expulsion of the product of conception. By means of this retraction the uterine walls rid themselves of blood, the fibres contract, the vessels diminish, become obliterated, and we need not fear the hemorrhages which would be inevitable without it.

There is yet a third property which is greatly developed in the uterus—*elasticity*, which in itself comprises two kinds of phenomena; *dilatability* and *retractility*. The enormous expansion which the organ undergoes without rupture and the rapid return of the same organ to nearly its former volume demonstrate that the uterus is endowed to a high degree with elasticity.

§ 4. THE DIFFERENT METHODS OF OBSTETRICAL EXPLORATION.—Before entering on the signs of pregnancy, we must describe touch, palpation, and obstetrical auscultation.

#### TOUCH.

Touch consists in the exploration of the various soft and hard parts which subserve the purposes of generation in the female, while it at the same time allows us to appreciate the relations of the foetus to the pelvic canal.

Two kinds of touch are practised—the *vaginal* and the *rectal touch*.

It is well for the obstetrician to practise touch with either hand; the position of the patient's bed may render touch with the left hand neces-

sary, a sore on the finger may likewise enforce this practice; but in general the right hand will be more convenient, the tactile sense being more delicate and hence more certain. An obstetrician cannot cultivate this sense too carefully.

### 1. *Vaginal Touch.*

Vaginal touch is practised with the index finger. Some physicians combine it with the middle finger; they claim that they can reach farther and obtain a clearer sensation; but Professor Depaul justly observed that the last two fingers of the hand do not flex as readily on to the palmar surface and are never so readily extended into the intergluteal groove as when they are accompanied by the middle finger. The index alone, therefore, will be preferred, at least for the diagnosis of pregnancy, and the middle finger might be added when the capacity of the pelvis is to be determined.

Before proceeding with this examination, the accoucheur anoints his finger with some fatty substance, both to facilitate the introduction and to guard against infection, instances of which have unfortunately been experienced.

Then the woman should be examined erect, or in the dorsal decubitus. The choice between these two positions is not immaterial. Thus, for instance, in certain cases touch in the dorsal decubitus alone will render the cervix palpable, where it is high up behind in the sacral excavation, because this position brings it back into the axis of the excavation, the uterus tilting back against the vertebral column.

*Touch in the Erect Position of the Woman.*—The woman to be examined is placed with her back against a piece of furniture or the wall, the examiner facing her; the knee opposite to the touching hand is flexed upon the floor, so as to serve as a rest to the touching hand; with the other hand applied to the abdomen the fundus uteri is supported, and perhaps slightly depressed to render it more accessible. The exploring finger is then presented horizontally toward the intergluteal fossa and carried from behind forward, so as to avoid the clitoris; arrived at the vulva it separates the labia majores and minores, penetrates gently up one-third of the vagina; then depressing the wrist, the elbow is carried toward the plane against which the woman is placed so as to bring the finger into the axis of the pelvic excavation. It is important that the knee corresponding to the touching hand should be placed on the floor, because the movements of the exploring arm are then freer, and besides, when touch has become habitual, the knee as a rest for the elbow can be dispensed with (Pajot).

The other fingers are extended along the perineum, which they raise, or flexed on the palmar surface of the hand, in accordance with the object—whether the anterior or posterior portions of the true pelvis is to be explored; in the latter case the elbow is brought nearer to the explorer.

*Touch in the Recumbent Position of the Woman.*—The accoucheur must place himself on the side corresponding to the hand with which he operates; the free hand, placed over the uterus, presses it backward and downward, according to the requirements, and the remainder of the operation is identical with that described above, the elbow resting on the mattress so as to permit the index finger to follow the axes of the pelvis.

In passing thus the entire vagina the finger must determine the condition of all the soft and hard structures encountered; especially ascertain the exact modifications of the cervix, the presentation and position of the fœtus, as well as the nature and seat of the numerous factors which may render the delivery spontaneous, difficult, complicated, or impossible.

If the vaginal touch be practised with the object of getting ballotement (see below), the finger must be slightly curved like a hook and enter, preferably, the anterior cul-de-sac, as the head of the fœtus is most frequently close to the symphysis pubis; moreover, the cervix in a primipara hardly ever admits the finger for the purpose of obtaining ballotement.

It may sometimes be desirable to practise *manual touch*, especially for the diagnosis of presentations or positions in the case of non-engagement during labor, or else when tumors complicate. In these cases we need not hesitate to introduce all the fingers except the thumb, and sometimes the entire hand into the vagina, chloroform being given, if necessary, before the latter operation.

## 2. Rectal Touch.

It is rarely employed. Nevertheless, it is demanded in cases of partial obliteration of the vagina, uterine displacements, extra-uterine pregnancy, and to ascertain the causes of dystocia [difficult labor] situated in the recto-vaginal septum. It is performed like rectal touch in surgery.

## ABDOMINAL PALPATION.

In order to practise abdominal palpation methodically, the woman must be supine and all the muscles relaxed, by flexing the head toward the chest and the thighs on the abdomen. The form, the volume, the tension of the abdomen are then the objects of special examination.

If we wish first to appreciate the degree of development of the uterus, we proceed with both hands, the fingers of which, all on one plane, are placed over the pubis, whence they ascend as far as the fundus of the organ so as to circumscribe it entirely and determine by its elevation the period of pregnancy. The ulnar side of the upper hand lightly depresses the abdominal wall: this constitutes palpation by *simple pressure*. Palpation by *mobilized pressure* is performed by placing one hand flat and keeping it



immovable, while pressure is exerted with the other. Finally, if we press rapidly with the ends of the extended fingers so as to feel the exterior ballottement, we shall produce *simple ballottement*; and, on applying both hands at two opposite points, we can obtain *double ballottement* (Mattei).

Quite recently, Pinard, in his "*Traité du palper abdominal*," after giving the history of this method of exploration, lays down precise rules for palpating, not only with the view to the diagnosis of pregnancy, but also for determining the presentation and position of the fœtus. He analyzes the various sensations furnished by palpation in the different presentations, positions, and varieties of position, as well as in multiple and in complicated pregnancies. We shall return to this subject at the proper time and place.

#### AUSCULTATION.

Auscultation, as applied to pregnancy, is a means of exploration the aim of which is to search for and recognize, by mediate or immediate application of the ear to the abdomen of the woman, the fœtal heart-sounds and the uterine murmur (*souffle*).

This mode of exploration, which dates back only to the beginning of the present century, furnishes signs of the greatest value. Not only does it indicate the existence of pregnancy, but it likewise permits us to ascertain the life or death of a fœtus.

In order that auscultation be satisfactory, the woman must be supine, the abdominal muscles relaxed, and the belly naked or covered with a thin cloth. The erect posture would be equally favorable, because in this position the fœtus approaches the anterior surface of the uterus, which has previously come into contact with the abdominal walls, while the liquor amnii flows backward and downward. But the possibility of depressing the abdomen and the convenience of the physician have led to the adoption of the horizontal position.

For auscultation we employ either the ear direct or use the stethoscope; the latter is less offensive to the modesty of the woman and, when pregnancy is not very far advanced, more easily displaces the intestinal loops so as to reach the gravid uterus.

It is important to choose the right instrument. Professor Pajot has had a stethoscope constructed which seems to us to unite great convenience with great precision.

By means of this instrument, applied perpendicularly to the hypogastric region, we perceive two distinct sounds: one of double pulsations, the fœtal heart; the other, a sort of rustling sometimes accompanied by shock (Pajot), is the *souffle*, which must not be confounded with the fœtal shock, of which we shall speak hereafter.

It is important to determine, by taking the woman's arm in the free

hand, that her pulse is not isochronous with the sounds heard, and that these sounds are therefore not due to the maternal circulation.

Authorities advise also to withdraw the hand from the instrument whenever it is in place, in order to prevent the arterial pulsations of the fingers in contact with the stethoscope commingling with the sounds we are endeavoring to hear and distinguish.

Auscultation is also of great service in the diagnosis of the presentations and positions of the fœtus; and to this subject we shall return later.

We do not think that percussion can furnish the accoucheur with sufficiently important signs to make it necessary for us to describe this method of exploration, which, at any rate, differs but little from ordinary medical percussion.

§ 5. SIGNS OF PREGNANCY.—The signs of pregnancy are divided by authors into objective and subjective symptoms. Tarnier and Chantreuil substitute for this division, which to them appears arbitrary, another based on clinical characters. We still adhere to that of Dubois and Pajot, which gives three kinds of signs: 1, presumptive signs; 2, probable signs; 3, certain signs.

Our object being to aid the student, we cannot do better, in the study of the signs of pregnancy, than follow the methodical table prepared by Professor Pajot:

#### A. PRESUMPTIVE SIGNS.

FUNCTIONAL MODIFICATIONS.	<i>Menstruation</i> .....	Suppressed.
	<i>Digestion</i> .....	Embarrassed; constipation and diarrhœa.
	<i>Secretions</i> .....	Mammæ, kidneys, skin, salivary glands, vaginal mucous membrane.
	<i>Innervation</i> .....	Neuralgiæ and neuroses.
	<i>Circulation</i> .....	Varices, œdema, palpitation, blood changes.
	<i>Respiration</i> .....	Mechanical troubles.

#### Remarks.

1. *Menstruation*.—Of all the phenomena which lead to the supposition of pregnancy, suppression of the menses is the first to manifest itself. While the catamenia can be, and often are suppressed without the existence of pregnancy, as for instance in chlorotic young girls; so, on the other hand, we see them continue, especially in the first months, although pregnancy is present; but these latter cases are rare, and, on attentive observation, we almost always note a variation from the normal, in the quantity or quality of the discharged blood, as well as in the time of its appearance, which ordinarily no longer coincides with the fixed period of the menses. They are hemorrhages rather than true catamenia. Finally, we see women become mothers before they have ever menstruated, which can be explained by the coincidence of the first spontaneous menstruation with

copulation, but it would be more difficult to explain pregnancy in women in whom the periodical flow has ceased.

[Cases of pregnancy occurring in girls who have never menstruated, in women in whom the periodical flow has ceased, or, as not rarely happens, during lactation without menstruation, are explicable upon the supposition that ovulation may take place without menstruation.—Ed.]

Be this as it may, the suppression of the menses is so constant a phenomenon that the women themselves attach great importance to it, and, in cases of doubtful pregnancy, it suffices for the physician to establish his diagnosis. Hence, in my opinion, this sign should be considered as a probable rather than as a mere presumptive sign.

2. *Digestion*.—Sometimes there is want of appetite or aversion to food, and nausea and vomiting which recur every morning and persist during the first three months, at times even during the whole course of pregnancy, which has thereby been jeopardized. Sometimes the appetite is insatiable, which is rather rare; but we frequently observe the taste to be depraved, so that the women eat with avidity chalk, charcoal, plaster, roasted coffee, etc. Finally, the gravid uterus exerts pressure on the rectum which partly causes constipation, so frequent in women, and as the rectum, moreover, has to absorb for two, there is less residue. Diarrhœa is much more rare, but nevertheless occurs and predisposes to premature labor.

3. *Secretions*.—Phenomena presented by the Mammæ. In primiparæ the areola around the nipples becomes darker, spotted, and covered with small elevated tubercles to the number of twelve to fifteen. When pressed between the fingers, they yield a whitish fluid; these are the papillary tubercles of Montgomery. Often, too, the breasts are tumefied, become the seat of a painful prickling, and on their surface a few large veins are seen to run like bluish cords, toward the areola. On pressing the breast it is possible to obtain, at the end of pregnancy and sometimes even after the fourth month, some colostrum; and in women who have nursed before a little true milk will escape.

The Kidneys. If the urine of a pregnant woman be kept in a test glass, there is formed on its surface, toward the third day, a thin iridescent pellicle, transparent, striated, and formed by the coalescence of a number of small, brilliant, crystalline granules which were previously scattered in the liquid. This thin pellicle is termed *kyestein*; it manifests itself from the second month on, but it is always evident from the third to the sixth; subsequently it diminishes. This phenomenon is not invariably present, and, in certain pathological cases, the urine of some women may contain it in the absence of pregnancy; and it may even be found in men's urine. Hence it is of no value, any more than the presence of albumen in the urine of pregnant women; though if the quantity of the latter should be excessive in the eighth month, and if it should be associated with œdema and cephalalgia, we should be led to fear nervous accidents, of

which we shall speak hereafter. A diminution of the calcareous salts in the urine has also been noticed.

**The Skin.** A deposit of pigment is formed in the *linea alba*, coloring it brown; the complexion becomes muddy, the eyes are sunken and surrounded by dark circles, the nose becomes sharp; yellowish spots appear on the forehead, around the nares, on the neck, and even on the thorax (mask). This condition has been observed to persist for a long time after delivery. It is evident that all these pigment changes have no diagnostic value except in first pregnancy.

**Salivary Glands.** *Ptyalism* is sometimes so intense as to debilitate the woman; fortunately it ceases spontaneously toward the end of the third month.

**The Vaginal Mucous Membrane.** Jacquemin has noticed a slate-colored appearance due to embarrassed circulation in the venous capillaries. The vaginal mucous membrane becomes covered with granulations and many women have an abundant *leucorrhœa*, of white or greenish color (granular vaginitis).

4. *Innervation.*—Often, at the beginning of, or during pregnancy, the imagination of the woman becomes exalted or her disposition irritable; some women pass rapidly from the deepest despondency to the greatest joy; others become suspicious, jealous, and extremely sensitive; the slightest provocation irritates them and moves them to tears. Finally, we frequently observe, especially in the earlier months of gestation, that women are troubled with nervous pains of all kinds, such as migraine, facial neuralgia, toothache, itching, smarting about the genitals—symptoms which our art is too often powerless to relieve.

Graver nervous troubles also manifest themselves in gravid women; eclampsia, of which we shall treat more in detail; amaurosis, unquestionably due to an excess of albumen; chorea, a rare complication which has only lately been studied, etc., and finally mania.

5. *Circulation.*—This function is ordinarily more active; the pulse is more frequent, fuller, and harder; blood drawn from a vein presents a very compact clot and a buffy coat. Sometimes there occurs cephalalgia, somnolence, dyspnoea, or profound depression—clear indications of general plethora. This plethora is rather frequently localized in the uterus, may give rise to slight contractions of this organ, and cause a diminution of the active movements of the fœtus. Sometimes plethora may be localized in other organs (Peter), and call for venesection.

Nevertheless we must not allow ourselves to be misled, and very often we have to deal with a *false plethora* or *hydræmia*, which, among women in cities, appears more frequently than true plethora; and, while the latter calls for venesection, the former, on the contrary, requires an invigorating regimen.

As a general rule, as Pajot states, in the pregnant female we find an



increase of fluids and a diminution of solids. In fact, the blood of gravid women presents a peculiar condition, characterized by an increase of water and a diminution of the red corpuscles, iron, albumen, and fibrin, except in the last three months, when the latter is augmented.

This augmentation of the blood-serum leads to hypertrophy of the heart, which is confined to the left ventricle (Larcher, Ducrest, Blot).

Moreover, at the same time the iliac vessels may be compressed by the weight of the uterus, the cellular tissue becomes infiltrated; the lower extremities, sometimes the trunk and the arms, become œdematous, as do the external genitals; there occur, also, especially in multiparæ, varices of the legs, of the labia majora, and hæmorrhoids.

6. *Respiration*.—As the uterus commences to develop, we see women suffer from oppression, fits of coughing, and asthmatic seizures, which force them to breathe rapidly. It is especially toward the eighth and the beginning of the ninth month that mechanical troubles attain a high degree. In the last fortnight, on the contrary, *locomotion* is affected.

#### B. PROBABLE SIGNS PERCEIVED BY THE AID OF THE TOUCH.

##### 1. *Changes in the Inferior Portion of the Uterus*.—

In the cervix uteri.	Form :	{	Primipara.	Cavity : fusiform.		
				Orifice : closed until delivery.		
				Multipara.	Cavity : funnel-shaped.	
					Orifice : {	external, generally open.
						internal, closed.
Length : diminishes during the last few days.						
Position : lowered until the third month, later more elevated.						
Direction : inclined toward the left and backward.						
In the body of uterus :		Augmented in volume and softened.				

2. *Ballottement* (a certain sign for some).—Sensation of a solid body, floating in a liquid, perceived by the examiner's finger placed either in the anterior cul-de-sac (Pajot) or within the cervix (Depaul).

#### *Remarks.*

*Changes in the Cervix*.—We have already studied the changes in the cervix uteri (§ 2); it remains for us merely to complete the sketch. Thus, as regards the consistence of the cervix, we know that it is diminished, that the softening extends from below upward, and that it gradually increases until it equals the softness of the vagina. As to the form of the cavity and the orifices, we have stated that they must be considered both in primiparæ and the multiparæ. In the former, the cavity is fusiform, the external os remains closed until delivery. Only exceptionally is it found open, admitting one-third of the tip of the finger.

In multiparæ the cavity is funnel-shaped, the base being below; the external os is generally open, but the internal os is closed, except in rare instances. At six months, the ungual portion of the phalanx penetrates into the cervix.

We are indebted to Professor Stoltz, of Nancy, for the observation that the length of the cervix diminishes solely during the last few days by the approach of the two orifices.

As to position and direction, the cervix is said to be lower in the beginning of pregnancy (Pajot alone holds it to be stationary); but at the end of three months the uterus, being too voluminous to remain in the

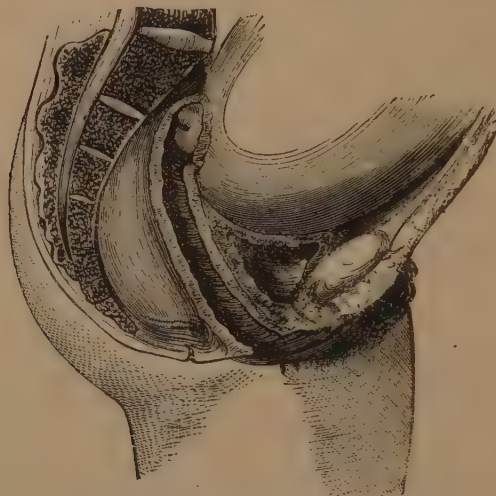


FIG. 29.—Common Position of the Cervix Uteri. Elevated and directed backward, so as to render it hardly accessible to the touch.

true pelvis, rises above the superior strait, carrying the cervix with it; and as the uterus at the same time inclines to the right and forward, the examiner will find the cervix very high, pointing toward the left, and situated in the sacral excavation. We shall see hereafter that the exaggeration of this inclination sometimes calls for artificial interference.

*Changes in the Inferior Segment of the Corpus Uteri.*—Touch gives us a sensation of increase in volume, together with softening, which has been compared with the impression received on touching an india-rubber vessel.

*Ballotement.*—This sign is of great importance, because many obstetricians consider it a certain symptom. It may be perceived from the fifth to the eighth month; before that the fœtus is too small; later, it is too heavy or too firmly engaged. This phenomenon is principally appreciable in vertex presentations. The index finger placed either in the anterior cul-de-sac, or within the cervix, but not in the posterior cul-de-sac, encounters a part of the fœtus floating in the liquor amnii. If, then, the

examiner impart, by a smart tap, an upward movement to the foetal portion (generally the head), leaving the finger in the position it occupied at the moment of imparting the impulse, the portion it repelled will certainly fall back upon it; this manœuvre may be repeated several times in succession, and constitutes ballottement. If the tap is too forcible, the recoil will not be felt, for obvious reasons. Depaul holds that it is not the recoil which constitutes ballottement, but the sensation of the foetal portion receding from the examining finger; thus interpreted, this sign would be less likely to deceive the practitioner. The last-mentioned professor compares this sensation with that perceived on striking in a similar way a piece of wood placed in a vessel full of water and suspended in mid-air. We prefer Pajot's comparison, who says that ballottement is identical with the effect produced by a piece of ice placed in a vessel full of water; if it be struck by the finger in a vertical direction, it sinks and comes back on the striking finger. This sensation of ballottement is perceptible, in some rare cases, through the abdominal walls.

Pinard, in his "*Traité du Palper Abdominal*," gives rules for obtaining ballottement through the abdominal walls; these rules, if carefully carried out, give abdominal ballottement of incontestable value as a sign of pregnancy.

Abdominal ballottement, in a case of breech presentation, may bear upon the cephalic extremity, which then corresponds to the fundus uteri, and as the head is very movable, unless it be engaged under the liver, we obtain a precise sensation, which has received the name of cephalic ballottement.

Ballottement can also be obtained with the extremities of the foetus. But however valuable ballottement be, it is never a sign of absolute certainty, for a carneous mole in the amniotic cavity may convey the same impression; this may even be the case with a pediculated polypus coexisting with hydrometra or certain cysts of the ovary (Pajot). These latter cases, however, are very rare.

PROBABLE SIGNS PERCEIVED BY THE AID OF PALPATION—C. CERTAIN SIGNS PERCEIVED IN THE SAME MANNER.

1. Changes of the superior portion of the uterus (probable signs).	Volume: gradual augmentation.	At three months: pubis, superior portion.
		At six months: umbilicus, slightly above.
		At nine months: epigastrium, slightly below.
	Consistence: diminished, softening.	
	Form: spheroidal at first, later ovoid.	
	Direction: from right to left, and from above downward.	
	Position: slightly twisted on its axis.	

2. Foetal movements (two kinds of signs).	Passive (probable sign).	{ Either imparted (Stoltz), that is, abdominal ballotte- ment;
	Active (certain signs).	{ Or spontaneous (Stoltz); it is necessary that they be per- ceived by the <i>accoucheur</i> .

*Remarks.*

*Changes in the Superior Portion of the Uterus.*—Above (§ 1) we have spoken of the uterine changes relative to its gradual increase; hence we need not revert to them here. We add simply, regarding *consistence*, that we sometimes obtain on palpation a cystic sensation and even an actual fluctuation.

The *form* of the uterus, which resembles when empty that of a pear, becomes spheroidal at first, and ovoid at the end of gestation. Its *direction*, from right to left and from above downward, may exceptionally be quite central or from left to right. Finally its *position*, that is to say its torsion, is such as to render the left lateral wall slightly anterior. This torsion is more manifest in certain animals.

*Foetal Movements.*—As the table indicates, they are of two orders, the passive and the active movements.

The *passive movements* are those communicated to the foetus by abdominal ballottement. This phenomena, as we have stated above, gives to the examiner the sensation of a mobile body floating in a liquid, and constitutes a probable sign, obtained either by palpation or by touch. By combining these two modes of exploration already described, we can obtain a new manifestation of abdominal ballottement.

The finger being placed in the vagina (as for touch) can elevate the foetal portion by a smart push given in the anterior cul-de-sac to the inferior segment of the uterus; and the left hand, if the right be employed for the touch, being placed flat on the abdomen, will perceive the impetus of the foetus which will strike it and will then drop back on the exploring finger; under these circumstances, the ballottement will be a sign of *great probability*.

The *active movements* are those executed by the foetus spontaneously or under the influence of a slight excitation. They are to be perceived by the woman, generally, toward the middle of pregnancy, that is to say, at four and a half months.

However, several causes of error exist, especially in women pregnant for the first time; being very feeble at first, almost insensible and comparable to "tickling," they become by degrees more marked and soon resemble undulations or shocks, which the flat hand, applied to the abdomen, or even the eye can perceive.



Otherwise they may be provoked, as Cazeau states, either by placing a hand on one side of the abdomen and tapping with the other on an opposite point, or by passing the cold hand over the foetal tumor. This causes the foetus to plunge, which it also may do spontaneously.

There is a spontaneous movement of the foetus which appears between the fourth and the fifth month, sometimes a week earlier, under the influence of causes as yet unknown, and which is so difficult of detection that it must be sought for with the stethoscope, like signs furnished by auscultation, and not with the hand. This sign has been designated by Professor Pajot as the foetal shock. It is a certain sign, which has the advantage that it manifests itself often before all the others, and which, despite its faintness, is more easily distinguished than the foetal heart-sounds at so early a period of gestation.

Under the moderate pressure of the instruments we experience at the same instant when the movement is produced a double sensation of *shock* and of a sharp bruit of extreme delicacy, as the result of a movement *in toto* of the foetus displaced bodily in the liquor amnii and striking the uterine walls.

As we know that the woman may confound foetal movements with those produced by displacement of intestinal gases, it is necessary, in order that this sign become invested with *absolute certainty*, that these movements be perceived by the examiner himself. It should be noted that some women perceive these movements previous to four months and others at a later time, which may depend chiefly upon the volume of the foetus; it happens, too, that after having been very distinct and very strong, they diminish in intensity and even cease altogether. The latter is always a grave sign, sometimes due to a plethoric state which indicates a resort to venesection.

#### SIGNS FURNISHED BY AUSCULTATION.

- |                              |   |  |
|------------------------------|---|--|
| 1. Murmur (uterine souffle). | { | Isochronous with the pulse of the mother.  |
| Probable sign.               |   |  |
| 2. Foetal heart sound.       | { | Resembles the ticking of a watch, from 108 to 160 beats per minute. Variable according to the position occupied by the foetus. |
| Certain sign.                |   |  |

#### Remarks.

The murmur (uterine souffle) belongs exclusively to the vascular system of the mother, because it is isochronous with her pulse, and variable, like it, under the influence of emotions she exhibits. This sound is not constant in all women: it varies in intensity from one moment to another; it may even stop suddenly and reappear an instant afterward with greater

or less force. It is sometimes accompanied by a musical sound or by a "whine." Finally, it is heard at the third month of gestation, toward the lateral and inferior parts of the abdomen.

Several opinions have been expressed in explanation of the *souffle*. Thus Kerkaradec held that the *souffle* is produced in the utero-placental circulation, and named it the *placental murmur* (*bruit*).

To refute this theory it suffices to consider that the *souffle* should then be heard in the same woman at one and the same point during the entire duration of pregnancy, which is not the case.

[We may add that this sound can be heard after delivery of the placenta; while in cases of placenta prævia the greatest intensity of the sound may be near the fundus uteri.—Ed.]

P. Dubois called it the *uterine souffle*; he located it in the vessels coursing in the depth of the uterine wall. It is indeed easy to convince one's self that there exists in the uterine vascular apparatus, modified by pregnancy, greater facility of communication between the arteries and veins at those points where the uterine walls seem to be transformed into an erectile tissue; the blood, passing rapidly from the arterial orifices, encounters in the veins, which possess a greater calibre, a column of blood which flows less swiftly, and from this passage the sound would be produced.

Bouillaud assigned its seat to the large posterior arterial trunks which are compressed by the uterus; for him, therefore, it was an *abdominal souffle*.

Finally, Bailly subsequently demonstrated that P. Dubois' explanation was the most rational, and that he was able to follow step by step the gradual extinction of the *souffle* after delivery.

Whichever of these theories be correct, Professor Pajot, leaving aside the heart and the great vessels, recognizes in the abdominal cavity only four kinds of *souffle* during gestation:

1st. The *ordinary* (*classical*) *souffle*, without shock, isochronous with the pulse of the mother, fugacious, and ordinarily heard on the lateral and inferior parts of the uterus.

2d. The *same* (*classical*) *souffle*, but accompanied by a *whine* or *musical sound*.

3d. The *souffle with shock*, heard at the same points, but accompanied by a shock or by an impulse perceptible by the ear or the hand.

4th. Finally the *fœtal sounds*, which are independent of the maternal circulation and separable into a cardiac and a funicular sound.

Otherwise the maternal *souffle* has but the value of a probable sign, because it may very well exist independent of pregnancy, a tumor or even hypertrophy of the uterine walls being capable of producing it by compression (Bouillaud).

*Heart Sounds*.—The pulse of the infant in intra-uterine life has a mean

of 130 beats per minute (108 to 160). It has been compared to the sound of a watch heard through a pillow or some other intervening body. It has also been asserted that it is less active in the male foetus and that the sex of the child could be predicted accordingly. This assertion is not entirely without some foundation; the following being its physiological explanation:

In large children the circulation is slower, because the arterial system ramifies over a greater extent and the impulse is always very nearly the same. Hence, as the male foetuses are generally larger than the female, we would have some chance of guessing aright if we diagnosticate a boy when the circulation is very slow (from 108 to 130). The opposite would obtain for a girl (130 to 160).

But it is easy to see that a large girl as well as a small boy would be frequent sources of error, and that, in cases where the circulation is between 125 and 140 no hypothesis could be established.

The position of the occiput being most frequently on the left side explains the fact that the heart-beats are heard most generally at one point toward the end of pregnancy; but if they were to be searched for between the fourth and fifth month they would be most likely to be heard close to the umbilical region.

These sounds are chiefly communicated through one of the thoracic walls of the child; and as the latter possesses far greater mobility until the seventh month, the spot where they are perceived, previous to that period, may vary considerably. They are all the more distinct and appreciable when gestation is farther advanced and if the liquor amnii is scanty.

Depaul, in his "*Traité d'auscultation*," published in 1847, wrote that the propagation of the foetal heart-sounds took place in the direction of the vertebral column. This theory, which we had admitted in our former editions, has since then been shown to be inexact. In fact, Ribémont has proved by frozen sections of a foetus that the heart is at least as far from the pelvic extremity as from the vertex. If, therefore, in the presentation of the cephalic extremity at the end of pregnancy, the heart-sounds are heard in one of the iliac fossæ, it is because the flexed vertex has engaged in the pelvic excavation and the trunk naturally follows it. When we treat of the diagnosis of the presentations and positions, we shall point out the advantages to be derived from Ribémont's experiments.

If after the sixth month irregularity of the heart-beats or their cessation be well established, it will often indicate that the foetus is diseased or dead.

#### PERCUSSION.

Percussion is a means of exploration which should not be neglected in doubtful pregnancy.

## TABLE OF THE SIGNS OF PREGNANCY METHODICALLY ARRANGED.

BY PROFESSOR PAJOT.

FUNCTIONAL CHANGES— furnishing presumptive signs.	SIGN	
	IN THE CERVIX UTERI.	IN THE BODY.
TOUCH—furnishing two kinds of signs.	1. <i>Changes in the inferior portion of the uterus.</i> Probable or sensible signs. (P. Dubois.)	<p>Consistence: Diminished, softening from below upward gradually until equalling the softness of the vagina.</p> <p>Form of the cavity and of the orifices. {  Primipara: Cavity fusiform, external os until delivery exceptionally (not very rarely) open, allowing one-third of the phalanx to penetrate. (Pajot.)  Multipara: Cavity funnel-shaped, external os generally open, internal os closed, barring rare exceptions. (At six months the ungual portion of the phalanx penetrates into the cervix.)  Length: Modified only in the last weeks, it diminishes. (Stoltz.)  Position: It is said the cervix is lower in the beginning, more elevated at the end.  Direction: Inclined to the left and backward, the result of the opposite inclination of the corpus.</p> <p>Increased in volume and softened (india-rubber).</p>
	2. <i>Ballotement.</i> Probable or sensible sign; certain for some.	Sensation of a solid floating body, movable in a fluid, perceived by the examiner's finger placed either in the anterior cul-de-sac (P. Dubois, Pajot), or within the cervix (Velpaux, Depaul).
SIGN	Menstruation: Suppression (the exceptions are very rare, but suppression from other causes than pregnancy is frequent). (P. Dubois).	
	Digestion: Derangements (loathing, nausea, vomiting), superexcitation of the function (rare), perversion (common). Constipation (ordinary condition); diarrhoea (exceptional condition).	
	Secretions: Phenomena presented by the mammae (tickling, swelling, areola pigmented, spotted, prominent, papillary tubercles, colostrum, milk, etc.); by the kidneys (lystein, albumen, diminution of calcareous salts); by the skin (mask, pigmentation of linea alba), salivary glands (ptyalism), mucous membrane (vaginal).	
	Innervation: Neuralgias (dental, facial, etc.). Neuroses, eclampsia, chorea, etc.; these complications are rare.	
	Circulation: Palpitations, varices, oedema, blood changes (diminution of corpuscles and increase of fibrin at the last).	
RESPIRATION: Mechanical troubles.		



PALPATION -- furnishing two kinds of signs.	1. <i>Changes in the superior portion of the uterus.</i> Probable or sensible signs.	Volume: Gradual augmentation.	<p>At 9 months, epigastrium, slightly below.</p> <p>8. . . . .</p> <p>7. . . . .</p> <p>At 6 months, umbilicus, slightly above.</p> <p>5. . . . .</p> <p>4. . . . .</p> <p>At 3 months, pubis, superior portion.</p>
AUSCULTATION -- furnishing two signs.	2. <i>Fetal Sounds.</i> Certain sign.	Consistence: Diminished. Softening. times, but very rarely.	Cystic sensation, very distinct fluctuation at
PERCUSSION--An indispensable means of exploration in some doubtful pregnancies.	1. <i>Murmur (suffle).</i> Probable or sensible sign.	Form: Empty, pyriform; pregnant, spheroidal; later, ovoid.	Direction: From right to left and from above downward (exceptionally quite central or from left to right).
PERCUSSION--An indispensable means of exploration in some doubtful pregnancies.	2. <i>Fetal Movements.</i>	Position: Slightly twisted on its axis, so as to render the left lateral wall slightly anterior.	Active or spontaneous (Stoltz): Of three kinds. Shocks against the lateral walls most common. Jolts, frictions (cold hand on the abdomen). Certain, but to be perceived by the examiner.
PERCUSSION--An indispensable means of exploration in some doubtful pregnancies.	1. <i>Murmur (suffle).</i> Probable or sensible sign.	Passive or imparted (Stoltz): Or abdominal ballotement, sensation of a mobile body in a liquid. Probable signs.	Isochronous with the pulse of the mother: fugacious--most frequently in the lateral and inferior regions of the uterus (placental souffle, Kergardec; abdominal souffle, Bouillaud, compression; uterine souffle, P. Dubois, arterio-venous aneurism). Three kinds of distinct souffles in the uterus (Fajot): 1st, souffle without shock, the most common; 2d, souffle with shock, rarer; 3d, souffle with the fetal heart, very rare. I have also, but very rarely, heard the whining sound described by some accoucheurs.
PERCUSSION--An indispensable means of exploration in some doubtful pregnancies.	2. <i>Fetal Heart Sounds.</i> Certain sign.	The ticking of a watch: 130 pulsations per minute on the average--108 minimum, 160 maximum; heard most frequently over the lateral and inferior portions of the uterus, and especially on the left side, because the occiputoliliac left anterior position is the most frequent. (Compare with the mother's pulse.) Fœtal shock. Certainty (Fajot).	

Now that we have studied all the signs of pregnancy according to the various modes of exploration to which they respond, we shall repeat them in their order of appearance from conception until delivery.

TABLE OF THE SYMPTOMS OF PREGNANCY, IN THEIR ORDER OF OCCURRENCE.

*First Month.*

Visible swelling of the mammæ, with itching and tingling.

Neuralgic pains in the jaws.

Nausea, ptyalism.

Expression of the face changes and there is a tendency to syncope.

At the end of the month, the first suppression of menstruation.

*Second Month.*

Glairy or "bilious" vomit, chiefly in the morning.

Flattening of the abdomen, depression of the navel, falling of the uterus.

Cervix more easily reached than normal; slight softening of the mucous membrane covering the external os.

Odd tastes, anorexia or pica,<sup>1</sup> capricious outbursts of temper.

At the end of the month, the second suppression of menstruation.

*Third Month.*

With the foregoing there is also :

Almost complete immobility of the womb, which now fills the pelvis.

The cervix becomes thicker; and in primiparæ, it becomes cylindrical instead of being pointed, while in multiparæ it merely enlarges, remaining cylindrical.

There is quite well-marked softening of the mucous membrane over the os externum, both in primiparæ and multiparæ, giving to the finger the sensation of a hard and smooth body covered over by a thick piece of cloth.

The external opening of the cervix enlarges slightly. In primiparæ it is no longer a transverse slit or line, but becomes ovoid, *yet remaining closed*. In multiparæ, where it is already rounded, it simply *opens* to a degree that admits the finger-tip.

At the close of this month the courses are absent for the third time. Should the abdominal walls be thin and supple, the fundus of the uterus may be felt, on palpation, above the pubis, while the cervix is yet low down in the pelvis.

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<sup>1</sup> Desire for filthy food, or slate-pencils, chalk, etc.

*Fourth Month.*

The breasts enlarge, the areolæ swell, and there is a deposit of pigment around the nipple, and fifteen or twenty papillary elevations appear thereon.

The uterus extends three fingers' breadth above the pubis. There is difficulty in reaching the neck of the womb with the finger.

Very marked softening of the os externum, which to the touch imparts a sensation of an œdematous mucous membrane.

In primiparæ the os now becomes perfectly round, but remains closed ; in multiparæ the orifice is enlarged and readily admits the finger-tip.

At the level of the base of the cervix the pulsation of the enlarged arteries can be felt ; this is *the vaginal pulse*.

Jacquemin has noticed, in addition, a violet color of the vagina due to impediment to the capillary circulation.

The first uterine souffle is now heard in the iliac fossæ : at this time Nauche states that the friction-sounds are heard.

Sound of the *fœtal shock*, perceived better with the stethoscope than with the hand. (Pajot.)

Fourth menstrual suppression.

*Fifth Month.*

Persistence of the preceding signs and appearance of positive signs.

Ballottement or passive movements.

Active movements of the fœtus.

Fœtal heart-sounds.

At the end of the month the fundus uteri is one finger's breadth below umbilicus ; the inferior third of the cervix is softened ; in multiparæ it permits the introduction of the entire ungual portion of the index ; but in primiparæ it continues closed. The menses are suppressed for the fifth time.

*Sixth Month.*

Confirmation of the certain signs.

Tuberculated areola of the mamma, brown line on the abdomen.

Ephelides (mask), lancinating pains. Cessation of the digestive troubles, good appetite. The woman has never felt better.

The menses are absent for the sixth time.

At the end of this month the fundus uteri has passed the umbilicus by 1 ctm. ( $\frac{2}{3}$  in.), and the cervix is softened in its entire lower half. In primiparæ it is still closed, rarely it admits the tip of the finger, while in multiparæ it admits the whole of the first phalanx of the finger.

*Seventh Month.*

Besides the above signs we find :

Numerous streaks on the skin of the abdomen, in the groins, and sometimes on the breasts. These stains persist after delivery.

Increase in the pigmentation of the nipples and of the brown line, enlargement of the tuberculated areola.

The menses are absent for the seventh time.

At the end of this month the fundus uteri reaches three fingers' breadth above the umbilicus and inclines then very markedly toward the right and forward.

The cervix is very high, points backward and to the left, is softened in the lower two-thirds. In primiparæ it barely admits the tip of the finger, but in multiparæ it admits the whole of the first phalanx of the index finger.

*Eighth Month.*

Persistence of the preceding signs ; ballottement is no longer felt, for lack of sufficient liquor amnii in the uterus, relative to the foetus.

At the end of this month the fundus uteri is five fingers' breadth above the umbilicus ; three-fourths of the cervix is softened. In multiparæ the finger is able to reach the internal os, and, if the woman has had many children, even this orifice is slightly gaping ; on the contrary, in women who have never had children, although the os tincæ permits the introduction of the first phalanx, the internal os cannot be reached and remains completely closed.

Menstruation is again absent.

*Ninth Month.*

First fortnight, the same signs as in the eighth month. Only the fundus fills the epigastrium and much impedes respiration ; the cervix is completely softened, but still preserves its length. It is open in pluriparæ as well as in primiparæ, its softness equals that of the vaginal walls ; but on introducing the finger into it we feel that the length of its cavity is unchanged. The ninth catamenial period has again failed to appear.

Last fortnight, engagement of the foetal portion, sometimes taking place earlier ; the situation of the uterus is lower, respiration becomes easier, locomotion is troublesome, and there are frequent calls to urinate. At the same time the cervix begins to be obliterated from above downward. Depaul says the uterus enlarges at the expense of the cervix, and consequently from above down. In primiparæ the base of the cervix still preserves a certain resistance, which does not disappear until the first phases



of labor ; in multiparæ the whole is softened, we feel the bare internal os to be very thin and slightly dilated.

Some pains and backache generally indicate that the moment of delivery is at hand.

## ART. II.—DOUBLE UTERINE OR TWIN PREGNANCY.

*Twin or compound pregnancy* is one in which two or more fœtuses are inclosed in the uterus.

*Double pregnancies* are the most frequent ; they will form the subject of the present article.

*Causes.*—Three principal opinions are extant in relation thereto : first, the fecundation of an ovule having two yolks ; second, fecundation of two ovules at the same instant ; third, fecundation of a second ovule after the formation of the decidua. It would have been better to have said above that we are reduced to conjectures. We can prove simply an individual predisposition transmitted to the offspring. This predisposition seems sometimes to pertain to the father. (Depaul, "Leç. de Cliniq. Obst.")

*Diagnosis.*—The abdomen is larger, it appears to be bilobular and flattened in the median line ; its greatest diameter is in the transverse direction, at least when the fœtuses are not placed one in front of the other. By palpation we demonstrate the presence of four large fœtal ends occupying the two iliac fossæ and the hypochondria, or else we find but three large fœtal extremities, the fourth being hidden behind the inferior surface of the liver, or engaged in the pelvis, where its presence may be recognized by vaginal touch (Budin). The active movements and the heart-sounds are perceptible at the same time at two distant parts ; the latter are not isochronous with each other. Ballotement is more difficult, often impossible, because the fœtuses hinder each other in the ascending movement which may be imparted to them. If one of the fœtuses presents by the head and the other by the breech, the difference between the points of maximum intensity of the heart-sounds and the inverse direction of the lines of decrease suffice not only for the diagnosis of the presence of two fœtuses, but also of their respective positions. If the fœtus presenting by the head should be dead, touch combined with auscultation would give the same results. Finally, if the diagnosis has not been made during pregnancy, the accoucheur can still, after the expulsion of the first fœtus, determine by the volume of the abdomen the probable presence of a second child. In this case, the active movements and auscultation will confirm the diagnosis, or should the fœtus be dead, touch, allowing the recognition of a second bag of waters or of fœtal parts, will clear up the situation. In cases of doubt, a safety ligature around the placental end of the umbilical cord is an indispensable precau-

tion, in the interest of the supposed child, before proceeding to a thorough examination.

*Prognosis.*—Physiological twin pregnancies are not ordinarily grave; they often terminate before term, owing to the exaggerated distention of the uterus, the organic contractility of which is sooner called into play. Hemorrhage and the presence in the pelvic canal of foetal parts belonging to two children are the only complications to be feared.

*Arrangement of the Membranes.*—In these pregnancies the membranes are not always uniformly arranged. Guillemot admitted four varieties:

1. Each embryo may be developed with its proper membranes.
2. Each foetus may have one proper membrane, the amnion, the chorion being common to both.
3. The embryos may be enclosed in a single cavity and have their membranes in common.
4. In case of fecundation and development of two ova, of which one encloses the other, the membranes are likewise common. This variety constitutes monstrosities by inclusion.

#### TERMINATION OF TWIN PREGNANCIES.

*First Variety.*—The two ova develop simultaneously, surrounded by their proper membranes, the chorion and the amnion. Each ovum may even have a decidua, but most frequently the portion forming the septum is absorbed, a single decidua envelops the embryos, and the chorions are contiguous. The placentas are blended or united by a membranous bridge, without there being any vascular communication between them, at least in the majority of cases.

The two foetuses are frequently born in the same labor. Still the uterus, having retracted after the expulsion of the first child, may remain inactive for several hours, or even one or two days, before it clears itself of the second. It may also happen that one foetus, having died, remains in the uterus or is expelled from it, while the other continues to remain and develop there until term.

*Second Variety.*—The chorion is common to both foetuses, but each is provided with an amnion apposed to each other so as to form a median septum. The placenta is single, and often a communication exists between the cords. The expulsion of one foetus leads to that of the other.

*Third Variety.*—The foetuses lodge in the same amniotic cavity. It is probable that at first each has its amnion, because this membrane emanates from the embryo, but that the median septum disappears subsequently by absorption so as thenceforth to form but a single and common bag. There is but one placenta, whence the cords may spring isolated or by a common trunk. No doubt the expulsion of one foetus is followed by that

of the other. It is this variety which produces adherent children (the Siamese twins, the sisters Millie-Christine, etc.).

*Fourth Variety.*—In this last variety the membranes are necessarily common, since one embryo contains the other; and as the two foetuses form in reality but one, the same labor suffices for their expulsion.

(For the completion of this study compare Depaul, "Leçons de Clinique Obstetricale," pp. 196 et seq.)

#### ART. III.—COMPLICATED PREGNANCY.

This is one in which some concomitant disease exists with the presence of a foetus, there being no disease which may not attack a pregnant woman. Thus the acute or chronic affections of the chest or abdomen, the eruptive fevers, cancer, and especially a tumor of the abdomen, of the uterus, or of the vagina may complicate pregnancy and exert an unfavorable influence upon it as well as upon the delivery. We shall revert to this subject in connection with dystocia.

#### ART. IV.—EXTRA-UTERINE PREGNANCY.

By *extra-uterine pregnancy* we understand the development of a foetus and its appendages outside the uterine cavity.

The ovum may be arrested and develop at any point of the passage it has to traverse before arriving at the uterine cavity, or it may drop into the abdomen. Hence there are a great many varieties of extra-uterine pregnancy, the most frequent of which are: 1, *ovarian*; 2, *sub-peritoneal pelvic (abdominal)*; 3, *tubal*; 4, *utero-interstitial*.

#### SITE OF EXTRA-UTERINE PREGNANCIES.

1. *Ovarian pregnancy* is one in which the ovum is developed on the ovary. A. Puech has reported several unquestionable instances of it.

2. *Sub-peritoneal pelvic pregnancy* results if the ovum, not having been received by the fimbriated end of the salpinx, insinuates itself, and develops, between the two layers of the broad ligament. This variety is one of the least rare and also the least grave; for, as it takes place outside the peritoneum and ordinarily in the pelvic cavity, the foetus is more surely reached, or its débris makes its way more readily toward the exterior.

3. In *tubal pregnancy* the ovum is arrested and develops at some part of the Fallopian tube, which becomes distended and forms the external envelope of the foetus. This variety must be the most frequent, bearing in mind the length and narrowness of this canal, as well as the numerous deviations and alterations to which it is liable.

4. *Utero-interstitial* is a pregnancy in which the ovum, having insinuated itself between the fibres of the uterus, penetrates the wall of this organ and develops there. The cyst which surrounds it is formed from the muscular fibres of the uterus.

#### ARRANGEMENT OF THE FŒTUS AND THE PARTS WHERE IT LODGES.

In extra-uterine pregnancies the ovum has its proper membranes, the chorion and the amnion, since they are but appendages of it. If it be difficult at times to recognize the chorion, it is because it has merged with the walls of the sac which incloses the fœtus. In the four varieties above enumerated there is never a decidua, properly so called; but the ovum excites around it a slight inflammation, producing a false membrane which takes the place of this tunic and serves for the external envelope of the ovum; this constitutes the *fœtal cyst*.

When the abnormal pregnancy continues, the fœtal envelopes may rupture, fistulæ may form and communicate with the intestines, the uterus, the vagina, the bladder, or with an external abscess.

As to the product of conception, sometimes it develops in a perfect and regular manner; sometimes it undergoes purulent softening, mummification, or else its detritus passes off in various ways.

The maternal parts on which the ovule develops become the seat of a profuse vascularization; new vessels form, and the circulation there becomes more active; the uterus even increases slightly in volume, and, as in uterine pregnancy, on its internal surface a decidua forms.

*Causes.*—They are all purely hypothetical, but more or less admissible. Those which are ascribed to a nervous agitation, to physical or moral shocks, such as a fall, fear, fright, surprise at the moment of fecundation, are improbable, because the ovum does not leave the ovary until at the time of, or even before, impregnation. It is far more rational to attribute extra-uterine pregnancies to a peculiar disposition of the organs, to constriction and deviations of the tubes, to engorgement of their membrane, or to a spasm they may undergo.

*Diagnosis.*—This is always very difficult in the beginning. Nothing can be predicted from the persistence of the menses, because the same phenomenon is seen sometimes with a normal pregnancy. Touch and palpation may give more certain signs of this freak of nature. Generally the extra-uterine fœtal cyst is more irregular, more uneven than the uterus; it is often inclined toward one or the other side of the abdomen, and sometimes deep in the excavation between the vagina and rectum, whence it can be explored and the different portions of the fœtus recognized. It would also be possible to demonstrate the empty condition of the uterus, the position of which has changed in the majority of cases. Finally, in the course of an extra-uterine pregnancy a new fecundation may take place.



*Duration ; Terminations.*—The duration of extra-uterine pregnancies varies from some weeks to several months or even years.

At the normal term of gestation, sometimes earlier, at other times later, the woman experiences pains similar to those of labor, which soon cease, to reappear some time afterward at variable intervals. These contractions can have their seat only in the uterus, and lead to the expulsion of the mucus and albuminous matters it incloses ; for, excepting tubal and interstitial pregnancies, the cysts do not possess any muscular fibres, which alone are capable of contracting.

In other instances, the cyst incites a very grave peritonitis, or, when distended beyond the natural limits of its elasticity, it ruptures and causes a rapidly fatal hemorrhage. Finally it may contract adhesions with neighboring organs, and, by means of a suppurative or ulcerative process, form abscesses which, opening externally or communicating with the rectum, bladder, uterus or vagina, permit the putrid fœtus to escape by degrees and piecemeal. This termination is the most favorable for the woman, who, after having been reduced to the last degree of marasmus, sometimes regains perfect health.

*Management.*—The indications vary according to the period of gestation. If it have been ascertained from the beginning that the ovum is implanted outside the uterus, its development must be prevented by repeated blood-letting, and especially by the constant application of refrigerants over the fœtal tumor. It is admitted that the dietetic regimen has too uncertain an influence on the development of the fœtus to rigorously submit the mother to it, but it may be combined with iodide of potassium.

[Other methods of treatment which have been employed in the early months are injection of poisonous agents into the sac, and the use of both galvanic and faradic currents of electricity—destruction of the child and arrest of development being the results which are sought to be obtained. Quite a number of well-authenticated cases have been reported, in which success has attended the use of the electrical current, the number of applications varying between one and a dozen. The current may be passed through the sac by needles penetrating into it, or by one pole introduced into the rectum with the other placed firmly upon the abdominal wall. There has been one case of recovery after vaginal incision of the sac by the incandescent knife.—Ed.]

Should grave accidents supervene before the seventh month, should the cyst rupture, it is still preferable to let the woman run the chances of an internal hemorrhage and consecutive inflammation, always combating it by repose, diet, cold to the abdomen, than to attempt to extract a non-viable infant by an operation almost invariably fatal.

When at term or after the seventh month labor seems to set in, it must be arrested by injections of large doses of laudanum. Indeed, it seems to be more rational to sacrifice the child than to expose the mother, by gas-

trotomy, to all the dangers incident to opening a large cyst, the lack of contractility of which may produce a fatal hemorrhage at the time of delivery, and which in all cases will be the source of a long and interminable suppuration. This grave operation would not be justifiable even if the labor were to continue in spite of all the means resorted to for its arrest.

Should the foetal cyst have contracted adhesions with the neighboring parts or communicate with the bladder, the umbilicus, the vagina, or the rectum, egress must be given to its contents by an appropriate incision.

Finally, should the pregnancy have exceeded the limits assigned by nature, this abnormal condition must be respected and no operation risked which might seriously jeopardize the life of the woman. In this case we should endeavor to reach the extra-uterine foetus through the vagina or the rectum.

Gastrotomy should be restricted only to those cases in which these procedures are impracticable; and, under these circumstances, the operation could be facilitated and the evacuation of the fluids into the peritoneal cavity be obviated by provoking adhesion of the cyst to the abdominal walls, by successive applications of Canquoin's paste or of any other caustic the action of which can be limited. Depaul, in 1866, succeeded in extracting a foetus by this procedure. Unfortunately, the woman died of cholera which then prevailed in the wards of the clinic. More recently, in the same institution, in 1873, the same professor, in a similar case, performed gastrotomy and extracted an infant weighing 2,300 grammes (five pounds avoirdupois) dead, near term, and macerated, having remained in the extra-uterine cyst for eleven months. The woman died on the seventh day.

Having emptied the foetal cyst, it must be left to itself; for it may have contracted adhesions with the neighboring viscera, and it would often be impossible or dangerous to extract it. Such has been the practice of the professor in the two cases last mentioned.

[Arguments in favor of gastrotomy after rupture of the cyst, or, in selected cases, before the occurrence of this complication, are the possibility of thoroughly cleansing the abdominal cavity of blood, liquor amnii, and vernix caseosa, as well as the removal of the foetus, which *may be viable* and capable of sustaining a separate existence.

The operation can add but little to the shock already present if the cyst has ruptured, nor are the dangers of the operation much, if any, greater than those attending prolonged suppuration and ulceration which are a part of Nature's method, often observed, of spontaneously ridding the human economy of a dead foetus having an extra-uterine situation. Abdominal surgery has made great strides in the past few years. When we find surgeons preferring to remove the kidney by anterior incision, through two

layers of peritoneum, rather than perform the posterior operation; when we hear of seventy consecutive and successful ovariectomies, why should not an operation such as gastrotomy, in extra-uterine gestation, be performed as certainly the only means by which the peritoneal cavity can be emptied of, or prevented from containing, the most irritating material which can find its way there. Experience has shown that the danger of alarming hemorrhage—which has often occurred after separation of the placenta—can be greatly lessened by allowing a number of days or even weeks to elapse before attempting to remove the placenta.

The principal, and, to many minds, the only argument standing in the way of laparotomy and removal of the Fallopian tube in suspected extra-uterine pregnancy at an early period, is the difficulty of making a positive diagnosis of the condition.—ED.]

#### ART. V.—MOLAR PREGNANCY.

This is due to an altered product of conception. The cause which determines this species of pregnancy seems to be either traumatic or moral, without our being able to explain in what way the alteration is effected. Three varieties are distinguished.

A. The *embryonal mole* or *false germ*, when the ovum is arrested in its development. It generally terminates by an abortion about the third or fourth month. The embryonal remains are found floating in the waters contained in a sac formed by the decidua, the chorion, and the amnion.

B. The *carneous mole*, which results when the false germ grows through its sojourn in the uterus, and its envelopes assume very great consistence and thickness, in consequence of exaggerated nutrition. Its volume varies from the size of an egg to that of a foetus at term. Its texture is filamentous and resembles that of the placenta. Its expulsion rarely occurs later than the fifth or the sixth month. Sometimes we meet with the remains of a foetus encysted in its interior.

C. Finally the *hydatidiform*, better called *vesicular mole*, which consists of a series of vesicles united into clusters, the individual particles of which are of different size and filled with a clear serous fluid which contains no echinococcus debris, and to which the name *vesicular* has been applied by several authors. In this kind of mole the foetus has been absorbed and the chorionic villi have hypertrophied (as has recently been demonstrated by Professor Charles Robin), and thus the vesicles are formed.

The vesicular mole is generally expelled from the fourth to the sixth month, in several instalments and piecemeal, thus exposing the patient to septic absorption and death.

## ART. VI.—FALSE PREGNANCIES, SO CALLED.

This is the name given, incorrectly however, to certain morbid affections, with or without a product in the uterus, which may simulate true pregnancy; hence this article belongs under the head of the differential diagnosis of pregnancy.

1. *Nervous Pregnancy*, which should rather have been termed *gaseous*. It is recognized by percussion, which gives a tympanitic sound, and by touch, which allows us to determine that the uterus is not increased in volume. It is observed chiefly in hysterical women who ardently desire to become mothers; the majority of the presumptive signs may coincide with this condition, which rarely persists until the term of pregnancy and often disappears under the influence of a purgative, a sea bath, change of scene, etc.

2. *Fatty Pregnancy*.—Depaul applies this term to a false pregnancy simulated by an enormous quantity of adipose tissue covering the abdominal wall, and accompanied, in nervous women, by an immoderate desire to have children. (Depaul, "Leçons Orales," 1864.) Even should some of the rational signs coincide with this condition, thorough examination by an adept in the art will establish a diagnosis.

3. *Hydrometra* results from an aqueous fluid secreted from the internal surface of the uterus and retained in its cavity through the occlusion of the os uteri from different causes. The absence of ballottement and of the foetal heart-sounds, and the demonstrable fluctuation, always distinguish this pathological condition from true pregnancy.

4. *Physometra*, true *tympanites uteri*, differs from gaseous pregnancy in that the gases contained in the uterus in physometra are generally the result of the putrid decomposition of the liquids secreted by the internal surface of the uterus, or of a portion of the secundines, of membranes which have not been expelled, or else of sanguineous clots which may be retained there after the menses.

In these cases, the uterine globe, easily circumscribed, gives, on percussion, a clear, sonorous sound; and if we seek to elevate the organ by the touch, we find that its weight does not correspond with its volume. Neither ballottement nor any of the certain signs of pregnancy can be demonstrated in this condition. Finally, fetid gases sometimes escape *per vaginam*.



## CHAPTER III.

### PHENOMENA OCCURRING IN THE PRODUCT OF CONCEPTION.

#### ARTICLE I.—INITIAL CHANGES IN THE OVUM.

WHEN at each menstruation one of the Graafian follicles swells, soon to rupture and discharge the ovule which it contains, this egg, surrounded by granular cells of the discus proligerus, falls into the pavilion or trumpet of the tube; the moment it escapes from the follicle, a phenomenon called spontaneous ovulation occurs. If it has been impregnated by the spermatic fluid at its exit from the ovary, it undergoes a series of peculiar changes during the six or eight days occupied in its journey toward, and its arrival in, the uterine cavity. For accounts of these the reader is referred to recent works on embryology.

At its maturity an ovum is composed of (1) an external, transparent—*vitelline*—membrane containing yellowish granules, the *vitellus*; (2) a little transparent body at one point in the egg, the germinative vesicle of Coste; and (3) a germinative spot in the centre of the former.

Scarcely does fecundation occur, when the second and third of these components disappear and the ovum becomes surrounded by a more or less thick layer of albumen, and its external surface exhibits numerous villousities.

In its journey through the tubes segmentation of the vitellus commences, the divisions and subdivisions occurring in the direction of the *polar globule*. This is an oily spot near the periphery of the ovum, making its appearance after the germinal vesicle and spot vanish. In each of the divisions and subdivisions of the vitellus is a central vitelline nucleus around which a quantity of granular matter accumulates, forming cells which col-

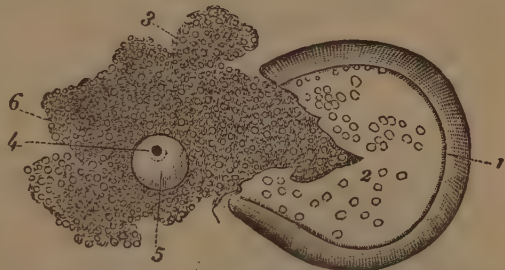


FIG. 30.—Rupture of Graafian Follicle and discharge of Ovum. 1, Graafian vesicle; 2, 3, 5, granulations of membrana granulosa and discus proligerus; 4, germinal vesicle; 5, ovum.

lect at the centre of the ovum, crowding against one another and looking like a mass made up of an agglomeration of polyhedral cells, having an appearance of a mulberry, and hence called the *mulberry body*.

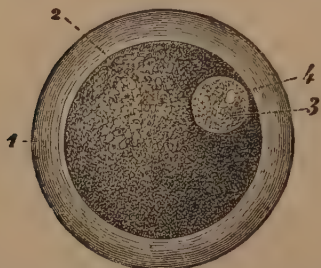


FIG. 31.—Human Ovum. 1, Vitelline membrane; 2, vitellus; 3, germinative spot; 4, germinative spot.

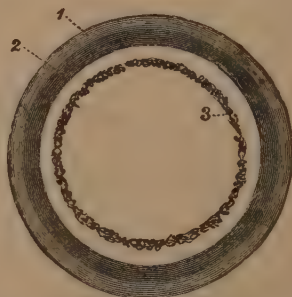


FIG. 32.—Blastodermic Membrane. 1, Albuminous layer; 2, vitelline membrane; 3, blastoderm from granulations of the segmented vitellus.

We do not know the cause of segmentation of the vitellus, but in it may be found the elements of an explanation of the organization of matter. And Bischoff has proved that each corpuscle of the segmented mass is endowed with motion. Does impregnation cause segmentation? Or, is segmentation a spontaneous phenomenon merely called into activity by the spermatozoa? In the present state of science it is difficult to answer these questions. Bischoff states that he has observed segmentation in ova which have not been impregnated; hence the doctrine of spontaneous segmentation is the more probable.

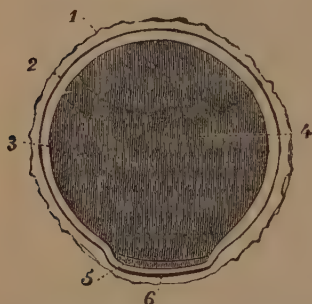


FIG. 33.—Division of Blastoderm and appearance of Area Germinativa. 1, Vitelline membrane already villous; 2, external or serous layer of blastoderm; 3, internal layer; 4, contents of 3, which is to make up umbilical vesicle; 5, area vasculosa; 6, area germinativa.

However this may be, the ovum after its arrival in the uterus possesses a new membrane—the *blastodermic*—situated underneath the vitelline membrane and formed by the cells of the mulberry-like mass flying from the centre and flattening against the vitelline membrane. This blastodermic membrane separates into two layers; and later, when the ovum has taken root by means of its villositities in the anfractuons hypertrophied uterine mucous membrane, there appears upon the external or serous surface of the blastodermic membrane the embryonic trace (*area germinativa*), which must not be confounded with the germinative vesicle and spot which have rapidly disappeared, as has already been said, before the formation of the polar globule. The *primitive trace* is the rudiment of the foetus.

For these changes the ovum takes 15 to 20 days, but to arrive at perfection no less than 250 or 255 days are required, during which other changes occur in pregnated ovum.

## ART. II.—THE CORPUS LUTEUM.

This is a more or less dense mass forming after rupture of the Graafian follicle, and, after a time, assuming a yellow or orange color in the human species, a bright yellow hue in the sow, gray yellow in the ewe, etc.

There are several theories as to the formation of the corpus luteum ; they may be summed up as follows : (1) Effusion of a coagulable fluid — blood according to some, plastic lymph according to others — into the cavity, which remains after rupture of the follicle ; (2) corrugation and ever-increasing hypertrophy of the internal layer ; and (3) yellow discoloration of the internal layer, either from a close approximation of molecular granules belonging to this layer (Coste) or by the coloring matter of the blood (Raciborski).

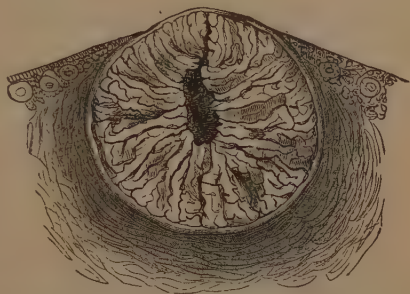


FIG. 34.—Formation of Corpus Luteum of Pregnancy.

There are two varieties of corpora lutea, (1) formed without impregnation, transient, and enlarging but a very little, and (2) that occurring in impregnated women, which increases for at least a month, and lasts until the fourth month, often longer.

Below are the varying measurements of the corpus luteum according to Pajot :

At the end of the	first month	it is	18 by 13 mm.	(.7 by .5 in.)
"	"	second	"	24 by 15 mm. (.9 by .6 in.)
"	"	third	"	25 by 18 mm. (1 to 7 in.)
"	"	fourth	"	15 mm. (.6 in.) in all directions.
"	"	fifth	"	13 mm. (.5 in.) " "
"	"	sixth	"	12 mm. (.5 in.) " "
"	"	seventh	"	10 mm. (.4 in.) " "

And during the eighth and ninth months it continues to diminish.

Traces of it have been found after delivery. It is finally absorbed. The formation of the corpus luteum is due to cicatrization of the Graafian follicle. After twin pregnancies two corpora lutea have sometimes been found, differing in size.

## ART. III.—FINAL CHANGES IN THE OVUM.

## TRANSIENT ORGANS.

We have followed the ovum from its exit from the Graafian follicle through the first changes it undergoes subsequent to impregnation. We have studied the formation of the corpus luteum in the follicle after expulsion of the ovum, and there remains to be considered the changes which the ovum sustains before perfect formation of the child. The embryo, finding in the uterus all that is necessary to its existence, is capable of leading an extra-uterine life after the 270 days that are necessary to its development.

In birds, however, incubation is necessary to render them viable. We have spoken of the *area germinativa* (Coste) which appears upon the serous

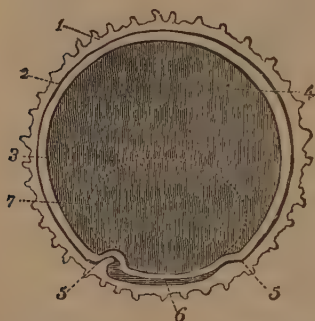


FIG. 35.—Formation of the Amnion. 1, Vitelline membrane; 2, external layer of blastoderm; 3, internal limiting layer; 4, umbilical vesicle; 5, rudimentary folds of amniotic envelope; 6, *area germinativa*; 7, *area vasculosa*.



FIG. 36.—Development of the Amnion. 1, Vitelline membrane; 2, external layer of blastoderm forming second chorion; 3, internal layer forming umbilical vesicle; 4, vessels of same; 5, inferior cephalic and caudal pouches whose continuation above forms the superior pouches; 6, embryo; 7, allantoic vesicle.

layer of the blastodermic membrane, where it forms a minute elevation upon the internal surface of that layer. As it becomes elevated it pushes toward the central cavity the internal or mucous layer of the blastoderm, without, however, becoming separated therefrom. Soon the *area* increases in width and thickness, assumes an elongated form, but being hindered in its growth by the ovum's walls, it folds in upon itself at either end, presenting, therefore, an internal concavity and an outer convexity.

In the centre of the *area germinativa* and running with its long diameter, appears a faint line, the *primitive trace* (embryonic line). This enlarges in all directions, its extremities turn upon themselves and become thicker than the centre. The extremities soon form two symmetrical large masses, called respectively the cephalic and the caudal extremities, the former being the larger. From this time the body of the embryo is



visible. Meanwhile the serous layer of the blastoderm, which became elevated along with the area germinativa, is reflected on all sides around the body of the embryo, covers the caudal and cephalic extremities, and its folds meet near the centre of the convexity of the embryo, constituting the dorsal hilus (amniotic umbilicus). Until now the reflected layer of the serous portion of the blastoderm was in contact with the whole of the embryo, but soon a fluid is secreted from the internal surface of this new covering which isolates the embryo, which henceforward floats free within this cavity.

Thus are formed the amnion, the amniotic fluid, and the cavity in which the latter is held ; for the amnion very quickly separates from the serous layer of the blastoderm, from which it originated, on account of the distention which it undergoes ; and being pushed farther and farther outward by the accumulating fluid, the amnion comes in contact with the vitelline membrane.

*Umbilical Vesicle.*—While these changes are occurring the internal or mucous layer of the blastoderm is compressed by the embryo, as the latter grows and as the incurvation of caudal and cephalic extremities progresses, so that part of this layer remains within the ventral opening, while the rest forms, outside of this, a kind of sac surrounded by the distended serous layer. This is the *umbilical vesicle*, having extensive communication with the intestines, which are formed by the other portion of the mucous layer. It is in this vesicle that the first traces of circulation appear, two omphalo-mesenteric arteries and omphalo-mesenteric veins. Within the embryo the arteries form the superior mesenteric vessels, and the veins, after having ramified throughout the whole intestine, unite to form the vena portæ and hepatic vein. This vesicle also contains a yellow-white fluid nourishing the foetus until the formation of the placenta.



FIG. 37.—Umbilical Vesicle. 1, Vitelline membrane, first chorion ; 2, external blastoderm ; 3, internal layer containing umbilical vesicle ; 4, its vesicles ; 5, dorsal hilus, convergence of lower pouches ; 6, embryo ; 7, the developing allantoic vesicle.

The fully formed umbilical vesicle is a little ovoid membranous pouch,  $5 \times 3$  mm. ( $\frac{1}{3} \times \frac{1}{3}$  in.). It is situated between the vitelline membrane (which, united with the external layer of the blastoderm, is now called the chorion) and the amnion. Very soon it elongates into a hollow pedicle still communicating with the intestine by means of an opening, which, however, is diminishing as the abdominal walls close in upon it : this is the *omphalo-mesenteric canal*. Henceforth it atrophies from day to day, on

account of the ever-greater distention of the amniotic membrane. The canal is obliterated about the thirty-fifth day, and henceforward only faint traces of it are found in the umbilical cord.

*The Allantoic Vesicle.*—About this time (thirty-fifth day) there appears, issuing from the inferior portion of the intestine, a small pyriform vesicle which rapidly enlarges, completing its formation within 15 or 21 days.

[The observations of Haeckel and others would show that the allantois commences its existence at an earlier period, viz., about the twentieth day. —Ed.]

This is the *allantoic vesicle*, which from the first contains the elements of the second or true fetal circulation. The vessels of the allantois are two arteries from the iliacs, and a vein going to the liver. The allantoic vesicle approaches, and spreading out, comes in close contact with the chorion, and envelops the whole foetal mass. Its vessels pierce the villi of the chorion, and then atrophy with the villi, except at the point of contact of the ovum with the uterine mucous membrane. Here, on the contrary, the allantoic vessels penetrate the meshwork of villi, ramify therein, forming the vascular portion of the placenta.



FIG. 38.—Development of Allantois. 1, Primitive chorion, scarcely visible; 2, external blastoderm; 3, allantois penetrating the villi; 4, umbilical vesicle; 5, closed dorsal hilus, the amnion now becoming a shut sac; 6, embryo; 7, pedicle of allantois that is to form the umbilical cord.

When the allantois comes in contact with that portion of the chorion which is to form the placenta, its calibre diminishes, soon becoming only a long canal which disappears in the substance of the umbilical cord. As soon as the ventral opening is closed the pedicle of the umbilical vesicle is found only within the abdomen, where it forms the urachus. At the opening of the latter into the rectum a pouch is formed, which subsequently becomes the urinary bladder: this pouch has been called the allantoic bladder.

The function of the allantois is to unite the vessels of the embryo and those of the chorion, so as to direct the former to the internal surface of the womb, where the placenta is to be implanted.

We shall not study every step in the development of the embryo, and the reader desirous of studying this in detail is referred to works on physiology.<sup>1</sup>

<sup>1</sup> Wundt: Nouveaux Éléments de Physiologie, Bouchard's translation.

The ovum is now made up, from without inward, of the following parts :

1. The decidua.
2. The amnion.
3. The placenta.
4. The chorion.
5. The umbilical cord.
6. Amniotic fluid.
7. Embryo or fœtus.

Each of these claims a paragraph.

§ 1. THE DECIDUA.—The act of conception induces richer circulation and more active nutritive processes in the uterus. The mucous membrane thickens, lining the uterine cavity with corrugated masses, and it undergoes important modifications.



FIG. 39.—Ovum Embedded in one of the Folds of the Decidua, which is Corrugated at its Base.



FIG. 40.—The Reflected Decidua Closed. 1, Inter-utero-placental tissue; 2, decidua reflexa; 3, ovum; 4, union of decidua.

The cells of the membrane increase in number and size ; the glandular follicles hypertrophy, becoming less adherent to the adjacent tissue, and finally obliterated from permeation of the epithelium, which becomes pavement ; the capillaries are increased in size and form, a rich plexus surrounding the orifice of the glands. The internal surface of the mucous membrane, called decidua, is smooth and uniform ; while the external surface in contact with the uterine walls is rough and villous. It is about  $\frac{1}{12}$  in. thick ; it has a gray red color, and a friable, œdematous feel. Fusi-form bodies and laminated fibres are no longer to be found. These changes are also found in abnormal pregnancies. Upon its arrival within the womb, the ovum sinks into one of these decidual folds, the latter forming a circular cavity for it. Very soon the ovum is covered like an issue-pea after cautery ; this is the *decidua reflexa* ; it has the same structure as the



uterine decidua, but it is thinner and is formed later, as it follows implantation of the ovum. At its most projecting portion there is a small depression seen in the earlier months indicating the spots where the folds of the decidua reflexa have united. Its internal surface is smooth and shining; the external, which is in contact with the ovum, is rough, uneven,

and attached to the villi of the chorion. The decidua reflexa never forms in extra uterine pregnancy.

The spot where the ovum is in contact with the uterus is the site of the placenta. The mucous membrane is here very vascular and the corresponding portion of the womb is interlaced with sinuses. The walls of the capillaries become absorbed, and their cavities unite to form lacunæ. The epithelium of the mucous membrane at this point hypertrophies, and penetrates between the placental cotyledons in proportion as the latter are



FIG. 41.—The Ovum at Three Months. 1, Amnion; 2, chorion and decidua reflexa; 3, parietal decidua; 4, inter-utero-placental tissue; 5, placenta; 6, section of uterine tissue.

formed; it is delivered with the placenta, whereas the mucous membrane does not exfoliate—the latter not being *decidua*. This is the epithelial layer preventing direct contact of foetal with maternal blood. The sinuses cease abruptly at the surface of the placenta, forming the *circular sinus*; but this last is not constant. This constitutes the inter-utero-placental tissue, separating placenta from womb, but serving as a means of union between the two. The decidua vera and the decidua reflexa—folds of the same membrane—surround a space containing a scanty fluid called *hydropерion*; later on this fluid disappears. The membranes approach, and finally fuse into one; their function is to close the uterine cavity so as to prevent the premature expulsion of the ovum, the position of which they render fixed. The fluid which they enclose nourishes the embryo up to the time when the villi of the chorion (buried in the *d. reflexa*) become obliterated.

The mucous membrane of the tubes and cervix undergoes no decidual changes: that of the latter becomes slightly thickened, while the cilia of its epithelium disappear. Its glands secrete a gelatinous fluid blocking up the cervix during pregnancy.



§ 2. THE CHORION.—The chorion is formed by the vitelline membrane, and the external or serous layer of the blastoderm. It is thin, impervious, smooth within, and villous without where it unites with the decidua. The villi are very numerous and grow rapidly at the point where the ovum is in contact with the uterine wall; they penetrate into the thick layer of the inter-utero-placental tissue at that point, finally forming the placenta.

This membrane is, externally, held to the decidua reflexa by means of short and slender filaments, the remnants of atrophied villi. Internally it is in relation with the amnion, from which it is separated by an albuminous layer whose thickness is greater the younger the embryo. This fluid is called the *vitreous humor*, from its resemblance to that in the eye. It may aid in the development of the ovum in the earlier periods of gestation. Then it gradually diminishes and finally disappears. At birth it is seen to be replaced by a very delicate reticulated tissue.

§ 3. THE AMNION.—This immediately surrounds the fœtus almost from the outset. It is formed by the blastodermic membrane, and it secretes a fluid, which distends its cavity and pushes it away from the fœtus: this is the amniotic fluid. At first it is separated from the chorion by the vitriform fluid, but later it is in apposition with that membrane and also forms a covering for the umbilical cord, being continuous with the skin of the embryo at the navel.

§ 4. THE PLACENTA.—This important organ, also called the after-birth, is seen after delivery as a soft, spongy mass, constituting the principal bond between fœtus and womb. It looks like a round cake, thickest at the centre: its form and dimensions vary.

*Dimensions.*—It is usually from  $\frac{3}{4}$  to  $\frac{4}{5}$  in. thick at its centre, and from  $\frac{1}{8}$  to  $\frac{1}{4}$  in. at its periphery. Sometimes it is much thinner, but then it is much broader. Its diameter is from  $6\frac{1}{2}$  to  $8\frac{1}{2}$  in. Its average weight is from 18 to 22 oz. avoirdupois.

*Form.*—The placenta is usually circular in form; when the cord is inserted centrally it is called the umbrella placenta; when at its border—the battledore placenta.

The placenta may be hollowed into a kidney shape, called reniform placenta; while at other times it is oval—divided into two lobes (*bilobar*)—or into several lobes, resembling numerous distinct organs.

The placenta has an external and an internal surface and a circumference.

The external or uterine face is slightly convex, corrugated, and marked by depressions dividing it into several cotyledons joined together by a soft albuminous tissue; this surface is separated from the uterus by the inter-utero-placental tissue already referred to. This is the surface felt in *placenta prævia*: hence the importance of being able to recognize it by the touch.

The internal or foetal surface is firm, smooth, and slightly concave; it

is covered by the chorion and amnion, traversing which membranes are numerous vessels which, uniting, form the umbilical cord.

The circumference is thin and uneven, being continuous with the chorions and contiguous with the double fold of the decidua.

*Development and Structure.*—The placenta is not visible until the end of the first month. It results from hypertrophy of the villi of the chorion located at the point of contact of ovum and womb. These villi grow, multiply, and are transformed into numerous vessels, which ramify and inosculate, forming plexuses which grouped together constitute the placental lobes or lobules, joined together by an albuminous material and covered by the mucous membrane of the inter-utero-placental tissue. After ramifying, these capillaries anastomose and form larger and larger vessels going to the umbilical cord. The chorion supplies them with a sheath into the substance of the placenta.

The maternal vessels are merely prolongations of those of the womb. Passing through the inter-utero-placental tissue they penetrate its interstices and enter each lobule, running in it in every direction, and after ramifying extensively they come in contact with the foetal vessels, but without inosculating with them. They finally turn back and empty into the uterine veins.

From this arrangement we see that the two blood-currents, without interference, pass and repass each other at numerous points, separated only by vascular walls of extreme thinness.

The placenta is thus an organ essentially composed of blood-vessels, yet it furnishes no direct communication between maternal and foetal blood, as the finest injections prove. There is merely a prolonged and extensive contact between the vessels, the foetal and maternal circulations being distinct.

*Insertion.*—The placenta may be inserted at any point in the uterine cavity. It is usually implanted at the fundus, but sometimes it is fixed over or near the cervix.

§ 5. THE UMBILICAL CORD.—This is a flexible bond uniting mother and child through the placenta. It is covered by the amnion, which acts as its sheath, and it contains the remains of the urachus and the pedicle of the umbilical vesicle. The cord seldom appears until about the end of the first month, at which time it is very slender and cylindrical; later on it increases in size, presenting nodules and numerous points of enlargement. Its average length is from 20 to 24 in. Some are only  $4\frac{1}{2}$  to 6 in. long; while others have measured more than a yard. When too short it is liable to be pulled and ruptured, or to be prematurely detached from the placenta, if not during pregnancy at least during labor. The traction of the foetus upon a short cord may cause inversion of the womb, or at least induce tedious labor; when too long it may suffer prolapse during labor, become twisted around the neck or a limb of the foetus in one or

more loops, and besides the dangers to the child this has all those of the short cord.

The cord is formed (1) by the two umbilical arteries arising from the bifurcation of the foetal abdominal aorta, and running toward the umbilicus, thence to pass into the placenta; (2) by the umbilical vein (larger than the former), which results from the junction of placental ramifications, and which meets and runs along beside the umbilical arteries at the internal surface of the placenta, finally to enter the abdomen by the umbilicus, whence it runs toward the concavity of the liver.

The umbilical vessels thus joined are twisted spirally from left to right, the vein being situated centrally. This twisting seems to be due to movements of the foetus on itself, and also the nodosities which are sometimes seen on the cord. But they are more especially caused by the vessels growing more rapidly than the sheath which envelops them. [The conflicting statements made by certain writers regarding the direction taken by the spiral vessels of the cord, and the observation of others, unprejudiced by theories regarding the cause of the twisting, seem to indicate that it is as often from right to left as from left to right.—Ed.] A gelatinous material surrounds them—“*the gelatin of Wharton.*” Fat, pasty, infiltrated cords contain it in abundance; “thin” cords, on the other hand, contain but scanty quantities of it.

The foetal extremity of the cord is always inserted into the foetal umbilicus; the maternal end leaves either the centre or periphery of the placenta. It has been found inserted into the membranes themselves, and in such cases it sends prolongations to the placenta. Finally, this end may arise by several distinct roots.

There are no nerves or lymphatics in the cord. It sometimes contains a loop of intestine, when the foetal abdominal walls have not completely closed. In such cases the obstetrician must first reduce this loop, so as not to include it in section or ligation of the cord.

Chantreuil and Charpentier have both studied the abnormalities of the cord; *vide* Chantreuil's “Thèse d'Agrégation,” 1875, and A. Charpentier's article on “The Cord,” in “Le Traité d'Accouchements.”

§ 6. LIQUOR AMNII.—The cavity of the amnion contains a watery, albuminous fluid, which is secreted by the membrane itself—the *liquor amnii*. This fluid is clear and limpid at the commencement of pregnancy; but later it may have more consistence and become viscid. At full term it is sometimes clear, sometimes contains flocculi, or again is turbid and greenish from the presence of meconium.

The quantity as well as the color varies. It is greatest in amount in the early months, and thereafter diminishes, so that at full term the foetus weighs four or five times as much as the liquor amnii. The chemical composition is variable. The specific gravity varies from 1.008 to 1.018. Its reaction is neutral or alkaline, odor resembles that of semen,

and it has a slightly salty taste. It froths when shaken. The presence in it of the salts of the urine has led to the statement that the foetus urinated in the amniotic cavity; and the fact of great distention of the bladder usually attending an impervious urethra, has been advanced as proof of the statement. But all authorities do not agree on this point. I myself reject the notion, basing my disbelief on the fact that, in a physiological condition, the meconium remains within the intestine.

The liquor amnii isolates the various parts of the foetus, protects them from shock from without, facilitates their movements, prevents their compression, and also that of the cord, and maintains uniform expansion of the ovum. Finally, during parturition it helps dilate the os, lubricates the genitals, and renders manipulation more easy in case the aid of the obstetrician is called in.

§ 7. THE FŒTUS.—*Steady Growth of the Embryo.*—The embryo is not distinct until the end of the third week. Then it is oblong, enlarged centrally, slightly curved forward, vermiform, gray-white in color, and gelatinous in consistence. It is  $\frac{1}{8}$  to  $\frac{1}{4}$  in. long.

At the *fifth week* it is  $\frac{2}{5}$  to  $\frac{1}{2}$  in. long, and it has a firmer consistence. The head can be made out, the eyes are indicated by two black spots, the nostrils by a little fossa, while the buccal cavity is a large opening. Four little tubercles indicate the site of the thoracic and pelvic viscera. The umbilical cord is inserted near the coccygeal end of the foetus, the liver filling nearly the whole abdomen.

At the *sixth week* the ovum is  $1\frac{1}{2}$  to  $1\frac{3}{5}$  in. long, while the embryo is  $\frac{3}{4}$  to 1 in. long, weighing 15 to 31 grains.

At the *seventh week* the embryo is 1 to  $1\frac{1}{4}$  in. long; the eyelids and pavilion of the ear are formed, and the nose begins to protrude.

At the *second month* the ovum is as large as a hen's egg, and the embryo is nearly two inches long, weighing about three-fourths of an ounce (avoirdupois). The division of arm and forearm is marked. The fingers and toes are separated, and the lips and genitals formed. The head is more than one-third of the whole body. The cord is inserted into the lower portion of the abdomen. Points of ossification appear in the first cervical vertebræ, and then, in order, in the ulna radius, scapula, ribs, occipital and frontal bones.

At the *third month* the placenta forms. The foetus is  $3\frac{1}{2}$  to 4 in. long, and it weighs  $2\frac{1}{2}$  to  $3\frac{1}{2}$  oz. (avoirdupois). The head, which has grown still larger, is supported on a visible neck; the eyelids meet; the papillary membrane is formed; the mouth closes; the fingers are completely separated; and the sex becomes apparent. The skin assumes some consistence; and the muscles become outlined. The umbilical cord is inserted near the pubis. The *thymus* gland forms.

At the *fourth month* the embryo is called foetus. It weighs about  $5\frac{1}{2}$  oz. (avoirdupois) and is  $5\frac{2}{5}$  to  $6\frac{2}{5}$  in. long. The skin is now rosy, the nails



are corneous, hair appears, and the insertion of the cord moves away from the pubis. The kidneys as well as the supra-renal capsules are quite large. About the middle of this month ossification begins in the astragalus and sternum.

At the *sixth month* it is about 12 in. long, and weighs from  $14\frac{1}{2}$  oz. to 1 lb.  $1\frac{3}{8}$  oz. (avoirdupois). The skin is firmer, the hair more plentiful, the skin is covered with a sebaceous coating, and the insertion of the cord approaches the middle of the body. The testicles or ovaries are still situated below the kidneys, and underneath the peritoneum. A fœtus born at this period is viable according to the French law.

At the *seventh month* the fœtus is  $12\frac{1}{2}$  to  $15\frac{1}{2}$  in. long, and weighs from 3 lb.  $4\frac{1}{2}$  oz. to 4 lb. 7 oz. (avoirdupois). The bi-parietal diameter of the head is nearly  $2\frac{3}{4}$  in., but capable of considerable diminution. The pupillary membrane disappears; the skin becomes harder and is still covered by a sebaceous coating. The supra-umbilical portion of the fœtus measures  $8\frac{1}{2}$  in., while the infra-umbilical portion only measures 6 in. The nails have not as yet reached the tips of the fingers; the testicles are close to the sub-pubic ring.

Now it is that science acknowledges the viability of the fœtus.

At the *eighth month* the fœtus is about 10 in. long, and weighs nearly 5 lb.  $7\frac{3}{4}$  oz. (avoirdupois). The bi-parietal diameter measures  $3\frac{1}{4}$  in. and is moderately reducible. The nails reach the finger tips, and the skin is firmer. The cord is inserted within  $\frac{1}{2}$  or  $1\frac{1}{4}$  in. from the centre of the body.

At the *ninth month* the average length of the fœtus is 20 in., and it weighs from 6 lb. 10 oz. to 7 lb. 12 oz. (avoirdupois). The hair is about an inch long, and the sebaceous coating to the skin is abundant. The bi-parietal diameter is  $3\frac{1}{2}\frac{2}{5}$  in., and the greatest reduction of which the head is capable is  $\frac{2}{5}$  in., according to Baudelocque. The umbilical cord is inserted about two-fifths of an inch below the centre of the body. The scrotum often contains the testicles, or at least one of them. In this month there is only developed a point of ossification between the two condyles of the femur.

#### ART. IV.—THE FŒTAL HEAD AT FULL TERM.

The head is the hardest, largest, and least reducible portion of the fœtus. It is the head which presents most frequently, and which is the greatest obstacle to spontaneous parturition when its dimensions are not in accord with those of the maternal pelvis.

It is *egg-shaped*, the larger portion being directed backward, and is composed of two parts—*cranium* and *face*. The former is the more important viewed from an obstetrical standpoint, and demands separate description. The diameters of cranium and face will be studied together.

§ 1. CRANIAL BONES.—These are the frontal, parietal, occipital, and temporal.

The *frontal*—a single bone in the adult—forms the forehead and the anterior superior portion of the face. In the foetus it is formed of two distinct halves separated by a mesial line. The superior angles are blunt, slightly divergent one from the other, and are yet farther removed from corresponding angles of the parietal bones. Each half of the bone presents a frontal eminence (*coronale*).

The parietal bones—two in number—are quadrilateral, situated at the sides of the skull, and meet in the middle line to form the vault or vertex. On each is a parietal eminence; the anterior angles are truncated, corresponding with the superior angles of the frontal, while the posterior angles are intact and completely formed.

The occiput, though still composed of two parts, evinces no trace of its division to the touch. Situated at the posterior part of the cranium its superior angle touches the posterior angles of the parietal bone, or at least there is left, at birth, only a very narrow space between the three. It presents the occipital protuberance and the foramen magnum.

The two *temporal* bones are at the sides of the skull below the parietal; they complete the lateral wall and aid in forming the base with the sphenoid and ethmoid.

§ 2. SUTURES AND FONTANELLES.—Sutures and fontanelles are the membranous intervals found between the cranial bones of the foetus. They facilitate cerebral development, and also allow a certain degree of reducibility in some of the diameters. From the standpoint of delivery they are most important in aiding diagnosis of the *positions*. The chief points are:

1. The *sagittal suture*, running from the root of the nose to the superior occipital angle between the two halves of the frontal and the two parietal bones.

2. The *coronal* or fronto-parietal, which runs at right angles to the former between the frontal and the parietal.

3. The *lambdoid*, which separates the parietal from the occipital; the summit of the lambda ( $\lambda$ ) is at the point of union of three bony angles, so that this suture is composed of two oblique lines.

4. The *squamous* or temporo-parietal sutures are also membranous and “reducible;” but they are inaccessible to the touch because of the temporal muscles, which cover them.

5. The *anterior fontanelle* is a large membranous space at the crossing of the sagittal and coronal sutures, and is called also the bregma. It is large, lozenge-shaped ( $\diamond$ ), and its facial angle at times reaches the root of the nose. It is never closed at birth.

6. The *posterior fontanelle* is situated at the point of junction of the sagittal and lambdoid sutures. It is triangular, smaller than the anterior,

and is often absent in the foetus at full term; but the finger can always feel the depression at the point where it has existed.

7. The *lateral fontanelles* are located at the extremities of the coronal and lambdoid sutures, and are very small and unimportant.

§ 3. DIAMETERS OF THE HEAD.—These are the imaginary direct lines between certain points upon the head. There are twelve of them, viz :

A. Three longitudinal.

B. Four transverse.

C. Five vertical.

A. *Longitudinal Diameters*.—1. The occipito-mental extends from the posterior fontanelle to the chin; it measures  $5\frac{5}{8}$  in. ( $13\frac{1}{2}$  ctm.). 2. The occipito-frontal extends from the occipital protuberance to the centre of the forehead; it measures at most 12 ctm. ( $4\frac{1}{2}$  in.).<sup>1</sup> Budin makes the anterior extremity of this diameter touch the root of the nose, a point, he says, more definitely fixed than “the forehead.” Hence his diameter would be shorter. 3. The sub-occipito bregmatic runs from the centre of the space between the occipital protuberance and foramen magnum to the anterior fontanelle; it is  $9\frac{1}{2}$  ctm. ( $3\frac{1}{4}$  in.).

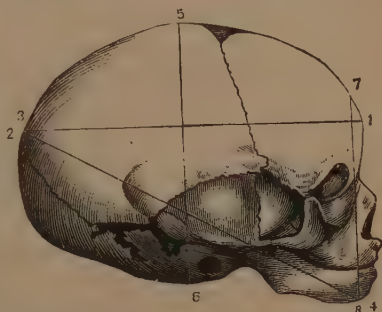


FIG. 42.—Diameters. 1, 2, Occipito-frontal; 2, 3, occipito mental; 3, 4, mento-frontal; 4, 5, trachelo-bregmatic.

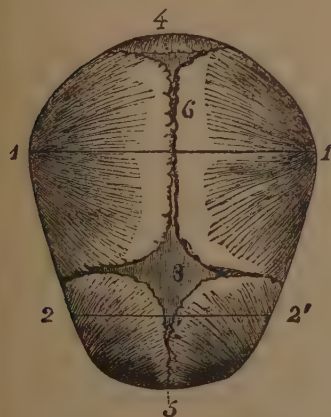


FIG. 43.—1, 1, Bi-parietal; and 2, 2, bi-temporal diameter; 3, anterior fontanelle or bregma; 4, posterior fontanelle; 5, 6, sagittal suture.

eminences, 8 ctm. ( $3\frac{1}{4}$  in.). 3. The mento-bregmatic runs from the mental process on the lower jaw to the upper part of the anterior fontanelle, 9 ctm.

B. *Transverse Diameters*.—1. The bi-parietal passes between the two parietal eminences, 9 to  $9\frac{1}{2}$  ctm. ( $3\frac{3}{8}$  to  $3\frac{1}{2}$  in.). 2. The bi-temporal runs from one root of the zygoma to the same point on the other side, 8 ctm. ( $3\frac{1}{4}$  in.). 3. The bi-malar joins the two malar eminences,  $7\frac{1}{2}$  ctm. (3 in.). 4. The bi-mastoid runs between the two mastoid processes, 8 ctm. ( $3\frac{1}{4}$  in.). It is incompressible.

C. *Vertical Diameters*.—1. The trachelo-bregmatic extends from the highest point on the anterior fontanelle to the anterior portion of the foramen magnum,  $9\frac{1}{2}$  ctm. ( $3\frac{1}{4}$  in.). 2. The fronto-mental joins the mental process of the inferior maxilla to the centre of the space between the two frontal

<sup>1</sup> The translator takes 1 ctm. to equal  $\frac{2}{8}$  of an inch; 1 mm. to equal  $\frac{1}{8}$  of an inch.

( $3\frac{3}{8}$  in.). 4. The trachelo-occipital extends from the anterior border of the foramen magnum to the occipital protuberance,  $8\frac{1}{2}$  ctm. ( $3\frac{3}{8}$  in.). 5. The cervico-frontal runs from the posterior portion of the foramen magnum to the centre of the forehead,  $9\frac{1}{2}$  ctm. ( $3\frac{4}{5}$  in.).

There is a circumference corresponding in name with each of the above diameters, cutting the head in a plane parallel to the diameter of the same name. The occipito-mental circumference measures about 36 ctm. ( $14\frac{1}{2}$  in.); the occipito-frontal 34 ctm. ( $13\frac{3}{8}$  in.); and the occipito-bregmatic (nearly corresponding to the circle of the straits) 26 ctm. ( $10\frac{2}{5}$  in.). They are of but secondary importance.

*Comparative Table of Chief Maternal Pelvic Diameters and those of Fœtal Head.*

FEMALE PELVIS.

	Antero-posterior. Inches.	Oblique. Inches.	Transverse. Inches.
Superior strait .....	$4\frac{1}{2}$	$4\frac{1}{2}$	$5\frac{1}{2}$
Cavity.....	$4\frac{4}{5}$	$4\frac{4}{5}$	$4\frac{4}{5}$
Inferior strait .....	5	$4\frac{3}{8}$	$4\frac{1}{2}$

FŒTAL HEAD.

	Inches.
<i>Antero-posterior diameters.</i> { Occipito-mental .....	$5\frac{1}{2}$
{ Occipito-frontal.....	$4\frac{4}{5}$
{ Sub-occipito bregmatic.....	$3\frac{4}{5}$
<i>Transverse diameters.</i> .... { Bi-parietal .....	$3\frac{1}{2}$
{ Bi-temporal .....	$3\frac{1}{5}$
<i>Vertical diameters</i> ..... { Trachelo-bregmatic .....	$3\frac{4}{5}$
{ Fronto-mental.....	$3\frac{1}{5}$

From the above it is seen that—

1. A child at term can only be expelled when one of its trunk-extremities presents head or breech.

2. The occiput, in vertex presentations, should always engage before the chin; and, in face presentations the chin before the occiput, since the occipito-mental diameter is larger than any of the cavity or inferior strait.

3. The most favorable position is that in which the head lies diagonally and is markedly flexed, for then the sub-occipito bregmatic diameter—the smallest—corresponds to the oblique, and its circumference is then parallel to the plane of the strait.

§ 4. REDUCIBILITY OF THE HEAD.—Baudelocque insisted, from his own experiments, that the strongest compression of the forceps never resulted in reducing the fœtal head more than  $\frac{2}{5}$  of an inch, and that the antero-posterior diameters were never increased.

This obstetrician experimented upon heads no longer in the womb—a



very different condition from that in which the head is in the uterus undergoing compression from instruments, pelvic walls, and uterine contraction. The very deformity of some heads after parturition is proof that marked reduction is possible. Does not spontaneous delivery at full term occur in pelves whose sacro-pubic diameter measures at most  $2\frac{4}{5}$  inches? Besides the thesis of Bailly (1866) proves that Professor Depaul passed foetal heads whose bi-parietal diameter was  $3\frac{2}{5}$  in. and  $3\frac{4}{5}$  in. into pelvic cavities whose antero-posterior diameter was  $2\frac{1}{5}$  and 3 in. respectively, by employing steady and ever-increasing force, without having compromised the life of the foetus. Joulin, experimenting on the cadaver with his *aide-forceps*, but using force incompatible with life, reduced the head 1,  $1\frac{1}{2}$ ,  $1\frac{1}{2}$ , and even  $1\frac{1}{5}$  in. without fracturing the cranial bones ("Traité d'Accouchements," page 276). From these data it appears that the reducibility of the foetal head varies in different subjects, but that it is much greater than formerly estimated.

§ 5. MOVEMENTS OF THE HEAD.—Flexion and extension of the foetal head are often very marked; the head may be turned far back upon the neck, so that the face looks directly upward, without any apparent harm occurring to the foetus. The lateral inclination is never so easy or extensive as the former. Rotation through a quadrant of a circle may take place without effort or violence; still, in spite of several cases where the face has been turned nearly directly backward without life having been compromised, one must never increase a movement of rotation beyond the point where the chin corresponds to the transverse diameter of the trunk.

#### ART. V.—DIAMETERS OF TRUNK—POSITION AND ATTITUDE OF FŒTUS—CAUSES.

1. The diameters of the foetal head have been studied; those of the trunk are less important, viewed from an obstetric standpoint. The superior and breech extremities of the trunk are much softer and more reducible than the head when pressure is exerted on them.

The bi-acromial diameter passes from the tip of one shoulder to the same point on the other, 12 ctm. ( $4\frac{1}{5}$  in.), but can be reduced to  $9\frac{1}{2}$  ctm. ( $3\frac{4}{5}$  in.).

The sterno-dorsal measures  $3\frac{4}{5}$  in.

The bis-iliac, between the two crests, measures  $3\frac{1}{5}$  in.

The bi-trochanteric is  $3\frac{3}{5}$  in.

From the posterior surface of the sacrum to the pubis is 54 mm. ( $2\frac{1}{5}$  in.), or 110 mm. ( $4\frac{1}{2}$  in.) if the thighs, flexed upon the abdomen, are included in a similar antero-posterior measurement. But on account of compressibility the transverse diameters are always the greater, and this all the more because there always exists the possibility of unflexing the limbs when there are obstructions to labor.

2. As the time for parturition is approached, the foetus in the womb

is bent forward, its head is flexed upon the chest, the arms touch the sides of the chest, the forearms are flexed and crossed in front of the thorax, the feet raised above the legs, the latter approximated to the posterior surface of the thighs, and the thighs to the anterior surface of the abdomen. The heels are crossed and touch the ischial tuberosities. Thus entwined and curved, it forms an ovoid 25 to 28 ctm. high (10 to 11½ in.). The larger end, the breech, is in the fundus; the smaller, the head, is directed downward toward the cervix.

3. Without formulating the many theories advanced to explain the frequency of head presentation, we may state, and modern obstetricians are of one accord on this point, that the true cause lies in the shape of the womb and that of the entwined foetal mass. Indeed their larger extremities correspond, and, with few exceptions, the head is received into the smallest part of the womb, *i.e.*, hangs lowest in the uterus. In this position the foetal and uterine axes are parallel; and as the foetus forms a mass the antero-posterior diameter of which is the larger, because of the limbs being bent upon its anterior surface, it follows that the anterior as well as the posterior plane should correspond to the lateral surfaces of the womb, which are more extensive than those in front and behind. In addition, from the twisting it underwent during development, the back of the foetus has been carried slightly forward or backward, toward the acetabulum or sacro-iliac synchondrosis. To gain this position, the foetus must be at term and the liquor amnii must not be excessive.

In Dr. Martel's thesis on "Accommodation in Obstetrics," the subject is studied from different points of view, but especially in its relation to pregnancy; this portion contains the causes of attitudes and positions. He has also considered accommodation during labor.

The latter subject, so clearly treated of by Professor Pajot, has enlightened most clearly what is truly new and original in Martel's thesis.

#### ART. VI.—FUNCTIONS OF THE FŒTUS.

The chief foetal functions are *nutrition, respiration, circulation, and secretion.*

§ 1. NUTRITION.—*A. Previous to the Development of the Placenta.*—The ovum is at first nourished by the albuminous fluid secreted by the uterus, which it absorbs by imbibition. Then the embryo absorbs the contents of the umbilical vesicle which reach it through the omphalo-mesenteric veins. The function of the umbilical vesicle is lost in proportion as the allantois grows. The fluid or vitreous humor contained between the amnion and chorion also serves for its nourishment before the placenta develops.

*B. After the Development of the Placenta.*—As the embryo grows the placenta forms from increase of those villi of the chorion which are to constitute it, while the others lose their vessels and become obliterated. The

umbilical vesicle atrophies and disappears. The placenta, which is merely a continuation of the allantois, becomes the sole means by which the nourishing maternal fluids reach the fœtus. The placenta is, then, an organ of absorption by means of the radicals of the umbilical vein; the latter draw from maternal blood a fluid which, carried to the fœtal liver, is changed into a new substance, albuminous and nutritive, and which is in part absorbed by the intestine into which it is poured along with the bile. The remainder, an excrementitious substance, accumulates as *meconium* in the gut. Some claim that the liquor amnii still aids, along with the placenta, in the nutrition of the *fœtus in utero*.

§ 2. RESPIRATION.—*A. Previous to the Formation of the Placenta.*—The respiratory apparatus is the chorion, covered with branching villi which, according to Serres, pierce the decidua reflexa to draw oxygen enough for the respiration of the ovum from the hydropерion (*decidual fluid*). This theory is nearly inadmissible, it being more probable that the respiratory function is in abeyance until after formation of the placenta.

*B. After the Formation of the Placenta.*—This now becomes a hæmic organ, and still continues its functions of absorption. The fœtal blood is here distributed extensively and runs in narrow, serpentine capillaries with very thin walls. It comes in close contact with thin-walled channels, in which maternal blood flows. Throughout its course there is an endosmotic interchange of gases, just as occurs in the adult lungs between inspired air and the blood in the alveolar walls. Joulin (*loc. cit.*, p. 313) regards giving off of carbonic acid by the placenta as the sole point of resemblance between fœtal and adult respiration.

§ 3. CIRCULATION.—The circulation in the fœtus is absolutely independent and distinct from that of the mother.

*A. Before Formation of Placenta.*—There is a complete circulatory current, but very restricted, uniting the umbilical vesicle with the heart, under the influence of which this vesicle has already been brought. It is called the omphalo-mesenteric circulation.

*B. After the Formation of the Placenta.*—We now have a circulation by means of the umbilical vessels. To recognize the special characteristics of this a few anatomical points connected with the vascular apparatus in the fœtus must be considered.

*Vascular Apparatus: Heart.*—As in the adult, the ventricles are completely separated; but the inter-auricular septum presents an opening, *foramen Botalli*, the *foramen ovale*, allowing communication between the two cavities. This orifice is furnished with a sort of membranous valve, opening from right to left, to allow the blood to flow in that direction, but which shuts and obliterates the foramen during contraction of the left auricle.

The pulmonary artery gives origin to a large vessel, the *ductus arteriosus*, which joins the aorta just below its arch. Thus the blood from the



two ventricles mingles with that of the arteries which go to the head and thorax.

At a level of the bifurcation of the common iliacs are the two umbilical

arteries, which run toward the umbilicus out of which they pass in the umbilical cord, to ramify in the placenta.

Finally, there is an umbilical vein, formed by the union of numerous ramifications within the placenta, which, leaving the foetal surface of the latter organ, follows the cord through the umbilicus, and enters the abdomen of the foetus, running to the under surface of the liver.

*Foetal Circulation.*—The umbilical vein carries blood oxygenated by endosmosis within the placental tissue; and arriving at the transverse fissure of the liver it divides into two branches. One branch joins the portal vein, distributing blood to the substance of the liver, whence, after elaboration, it passes into the inferior vena cava by means of the hepatic veins. The other branch, the *ductus venosus*, runs in the direction of the main trunk and also empties into the vena cava inferior, whence the blood passes into the right auricle, there to mingle with the blood from the upper portion of the body carried downward by the vena cava descendens. The left auricle, empty (for the pulmonary veins have not as yet emptied any blood into it), now dilates, and by an act of aspiration sucks blood

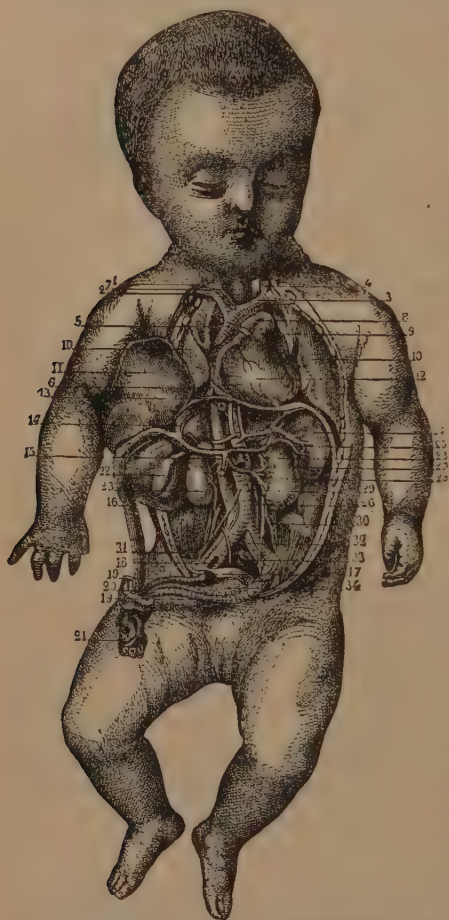


FIG. 44.—Relation of Organs in, and Circulation of, the Fœtus. 1, Right common carotid; 2, right vena innominata; 3, left vena innominata; 4, internal jugular vein; 5, superior vena cava; 6, inferior vena cava; 7, thyroid gland; 8, origin of aorta; 9, pulmonary artery; 10, lungs; 11, liver; 12, heart; 13, diaphragm; 14, ductus venosus; 15, portal vein at its junction with splenic and mesenteric; 16, umbilical vein; 17, uterus; 18, 19, umbilical arteries; 20, urachus; 21, vessels of the cord; 22, gall-bladder; 23, kidneys; 24, spleen; 25, celiac axis; 26, aorta before dividing into common iliacs; 27, left renal vein; 28, left renal artery; 29, inferior mesenteric artery; 30, left ovarian artery; 31, right ovarian artery and vein; 32, left common iliac vein; 33, left ureter; 34, urinary bladder.

from the right auricle through the foramen ovale.

As the ventricles dilate they also draw the blood from the auricles into their cavities, and then contracting, the right throws its contents into the pulmonary artery and the left into the aorta.



The pulmonary artery carries but a small portion of blood to the lungs for their nourishment ; and this, after having gone through the capillary district, returns from the parenchyma to the superior vena cava. By far the larger quantity passes into the ductus arteriosus, which empties into the aorta, there meeting blood coming from the left ventricle. At the lower portion of the aorta a part of this blood enters the arteries of the lower extremities, while a part enters the umbilical arteries and goes to the placenta, where, after being oxygenated by the maternal vessels, it is collected by the rootlets of the umbilical vein and again passes through its (above described) cycle. Thus we see that venous and arterial blood mingles in the auricles and in the inferior cava. Furthermore, the ductus arteriosus allows extensive communication between the two ventricles : hence, in the fœtus, circulation is as simple as if the heart were composed of two cavities only, one auricle and one ventricle. The blood contained in the aorta comes from, and is forced along by the simultaneous contraction of both ventricles ; and this force is transmitted to the cord, causing it to pulsate. When respiration begins blood rushes to the lungs through the pulmonary artery and the propulsive force in the aorta is diminished by half. Hence we notice pulsation of the cord, diminishing as respiration becomes more regular and complete ; and we notice it reappearing directly respiration is suspended, since the foetal circulation (from right ventricle into aorta) is re-established.

When there are obstructions to respiration umbilical hemorrhage occurs in the new-born if the cord has not been ligated.

*Changes in Foetal Circulation after Birth.*—When the child escapes from the womb, or just before the end of labor, the placental circulation diminishes and ceases completely. The defective oxygenation that results induces a congested state of the brain that excites it and induces contraction of the muscles of inspiration. The air enters and dilates the lungs, the child cries, and life is fully entered upon.

Thenceforth an abundance of blood is brought to the lungs by the pulmonary arteries, and it ceases to flow through the ductus arteriosus and foramen ovale, which become narrow, and close about the ninth day, sometimes earlier, rarely later. The umbilical vessels, receiving no more blood, also diminish and are changed into fibrous cords about the third week, their walls meeting and undergoing hypertrophy.

§ 4. SECRETIONS.—Meconium is the excrementitious part of the blood which liver-tissue has changed into a new substance. It is whitish until the middle of pregnancy. Bile is, then, also colorless ; but soon it darkens and, poured into the intestine with meconium, the latter becomes greenish-yellow, at the same time it assumes more consistence and viscosity. It thickens and darkens as term approaches, when it fills the large and small intestine. Only when the fœtus is injured in some way is meconium discharged into the liquor amnii.

The urine is scanty in intra-uterine life. Jacquemier thinks that it is all held in the bladder; Depaul, that it is discharged into the liquor amnii, in which its constituents are often found. I think this only occurs pathologically, as is the case also with the meconium.

A somewhat consistent grayish fluid is found in the stomach of the foetus. The free and contiguous surfaces of serous membranes are moist and lubricated; and a layer of fatty matter, from the sebaceous glands, covers the skin in irregular patches.

[For further particulars regarding foetal life *vide* "Le Dictionnaire Encyclopédique des Sciences Médicales," by Dechambre, art. on "Fœtus," by A. Pinard.—Ed.]

## Part 3.

# PARTURITION.

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## CHAPTER I.

### PRESENTATIONS AND POSITIONS.

#### ARTICLE I.—DEFINITIONS. CLASSIFICATION.

PRESENTATION is the name of the foetal part which first presents itself at the superior strait.

*Position* is the relationship of *that part* with the different points upon, and diameters of, that strait.

The two terms must never be confounded. Their appreciation rests upon the recognition of certain distinguishing parts, generally agreed upon, situated on the foetus.

In this work, meant to be essentially practical, we shall not enter into details of classification. We shall adopt that of Naegele and P. Dubois, which is simple and comprehensive. It is accepted by the majority of French obstetricians.

*Presentations.*—There are five, corresponding to the three regions of the foetus.

- |                            |                                      |
|----------------------------|--------------------------------------|
| A.—Cephalic extremity..... | { 1. Flexed head, or <i>vertex</i> . |
|                            | { 2. Extended head, or <i>face</i> . |
| B.—Pelvic extremity.....   | 3. Breech.                           |
| C.—Trunk.....              | { 4. Right lateral plane.            |
|                            | { 5. Left " "                        |

1. *Flexed Head, Vertex.*—This is the most frequent presentation. The head is flexed on the chest. The posterior fontanelle is the part felt and indicative thereof.

2. *Face*.—This is, in reality, an extended vertex presentation. The occiput approximates to the nuchal region. The chin is the part for recognition; Stoltz, Depaul, and Joulin prefer the forehead, however. In spite of their arguments for this preference, we shall, with Cazeaux, Pajot, and the majority of obstetricians, continue to regard the chin as the part distinguishing this variety. Is it not the part, in face presentations, that first engages under the symphysis as the occiput in vertex? Besides, there are difficulties in diagnosing the forehead.

3. *Breech, or Pelvic Extremity*.—In this the legs are usually flexed on the thighs, and these upon the abdomen. The sacrum thus replaces the occiput, and the coccyx determines the relation of the parts which are to be made out. The above relations may, however, be disturbed, and the foot or knee may engage before the breech, thus making a number of sub-varieties. Delivery occurs through the same mechanism, however. The os calcis—the distinguishing point for the feet—and the crest of the tibia (point for knee presentation) always indicate the situation of the sacrum.

4. *The Right Lateral Plane, i.e.*, the right half of the foetus, is that part of the trunk comprised between the shoulders and hips of the right side. The shoulder usually corresponds to the centre of the pelvis, but it may be more or less turned therefrom, so that we find the side of the neck, a part of the chest or thigh, or a part of both anterior and posterior planes occupying its site.

5. *The Left Lateral Plane*.—The same may be said for the left half of the body as for the right.

The diagnostic points for the two trunk presentations are the prominence of the shoulder-joint, the axillary fold, the scapula, the ribs, the elbow, and sometimes the ilia, sternum, and spine.

All the above may be regular or irregular; the parts may lie directly in the centre of the superior strait, or be inclined to its plane. Lachapelle classifies the latter as *hybrid positions*. Naegele, Cazeaux, and Dubois place them under the head of abnormal (difficult) labors. They usually correct themselves, however, and alter but little the mechanism of labor. Yet they sometimes cause tedious labor, or absolutely prevent delivery. Joulin (*loc. cit.*, p. 515) gives a lengthy account of irregular presentations of vertex and breech.

*Position*.—That part of the foetus which first presents may be in relation with every point in the periphery of the superior strait. To facilitate matters and indicate positions methodically, Naegele divides the pelvis into two lateral halves. In each of these are three chief points, which correspond to as many positions. These are (1) in front the two ilio-pectineal eminences; (2) the middle of the brim on each side; and (3) the two sacro-iliac synchondroses. Hence, with this division we have on either side positions called anterior, transverse, or posterior iliac. Joulin is cor-



rect in stating that Velpeau's division of the pelvis into an anterior and posterior portion is more favorable to the study of the mechanism of labor, which is very different according as the occiput is in front or behind. In either case a knowledge of the six unvarying points just named with distinguishing parts upon the foetus, will enable us to readily name the position. Thus in vertex, face, or breech presentation, the occiput, the chin, the sacrum (or the tibia and os calcis, provided the limbs become unfolded from the body) will correspond in the first position to the left ilio-pectineal eminence; in the second, with the right sacro-iliac synchondrosis; in the third, with the right ilio-pectineal eminence; in the fourth, with the left sacro-iliac synchondrosis; in the fifth, with the centre of the brim on one side; and in the sixth, with a similar point on the opposite side.

To simplify this classification further Joulin omits the transverse, thus reducing the number of positions to four. Besides, transverse positions are very rare, usually being met with only with constricted pelves. The relative frequency of positions admits of an orderly classification of what may be called primary; but there are secondary positions through which all those just named must pass, and which will be considered under mechanism of labor. According to Joulin's modification, there are twelve positions for the first three presentations. In our lectures we have frequently called attention to this simple arrangement, based solely on the utility it possesses for practice and operation. But as transverse positions are met with in contracted pelves, and since interference is here the rule, we think it useful to place them in the classification.

Finally, and purely from a practical standpoint, I purpose, instead of dividing the pelvis into two lateral halves by an antero-posterior line—instead of dividing it into an anterior and posterior region by a transverse line—I purpose to divide it according to each oblique diameter, the lines intersecting at the centre of the pelvis. Each prominent point will now be at the extremities of each diameter, and the study of operations is greatly simplified (*vide* Section on Forceps, Part 5) by such a useful division, a division followed by Professor Pajot in operations. In very rare cases occipito-pubic and occipito-sacral positions have occurred at the beginning of labor. At times credited and again disbelieved, such positions have no place in our classification.

In transverse presentations the right lateral plane, or right shoulder, presents oftener than the left, and the dorso-anterior occurs oftener than the posterior. The dorso-anterior is the first of our right lateral plane; the head corresponds to the left half of the pelvis (left cephalo-iliac, back looking forward). When the back looks backward we have the second position (right cephalo-iliac).

Similarly there are two positions for the left lateral plane, or left shoulder; in the first, the head is toward the mother's left, and the back looks backward (left cephalo-iliac, back looking backward). The second is the

right cephalo-iliac, the back looking forward. This latter is more frequent than the former in the proportion of 57 to 47. The latter is maintained, however, so that there may be but one distinguishing point, the *head*, which is to the left in the first position of shoulder presentations, and to the right in the second. But since trunk presentations have special characteristics this exception lacks the importance it would possess with any other presentation.

TABLE OF PRESENTATIONS AND POSITIONS IN THEIR ORDER OF FREQUENCY, WITH RECOGNIZED ABBREVIATIONS.

[It becomes evident to the reader, at once, that in the description of the various *positions* of the foetus, there is a different use of *terms* from that common in obstetrical text-books which are read by Americans. We are accustomed, as is the author, to the use of the expression first position when the occiput is situated anteriorly and a little to the left. In our understanding of the second position we recognize that which the author describes as the third, viz., the occiput, the sacrum, or some other recognized part of the foetus lying anteriorly and behind the ilio-pectineal eminence. Our third position is the second of the author, while we agree with him in his description of the fourth.—ED.]

*Vertex.*

1. Left anterior occipito-iliac.....	L. O. A.
2. Right posterior " " .....	R. O. P.
3. Right anterior " " .....	R. O. A.
4. Left posterior " " .....	L. O. P.
5. Left transverse " " .....	L. O. T.
6. Right " " " .....	R. O. T.

*Face.*

1. Right posterior mento-iliac.....	R. M. P.
2. Left anterior " " .....	L. M. A.
3. Left posterior " " .....	L. M. A.
4. Right anterior " " .....	R. M. A.
5. Right transverse mento-iliac.....	R. M. T.
6. Left " " " .....	L. M. T.

*Breech.*

1. Left anterior sacro-iliac.....	L. S. A.
2. Right posterior " " .....	R. S. P.
3. Right anterior " " .....	R. S. A.
4. Left posterior " " .....	L. S. P.
5. Left transverse " " .....	L. S. T.
6. Right " " " .....	R. S. T.

*Lateral Planes.*

Right.....	{	1. Left cephalo-iliac dorsal plane forward.			
		2. Right	"	"	backward.
Left.....	{	1. Left	"	"	backward.
		2. Right	"	"	forward.

Thus it is seen that, like Pinard, we can replace the word *cephalo* by *acromio*.

In the three vertex face and breech presentations, the first two positions correspond to the two extremities of the left oblique diameter; the third and fourth, with the extremities of the right oblique; the transverse positions are inserted only for memory. The modifications proposed by Stoltz and recognized by Joulin cannot be applied to trunk presentations; for in the latter the transverse position, if it undergoes modifications, does not change in the least either labor or the rules for interference. As there are irregular or inclined presentations, so there are incomplete hybrid and intermediate positions (Lachapelle). From a diagnostic standpoint it is important to dwell briefly upon each one so that the practitioner shall readily recognize them. In the majority of instances things right themselves, and inclined positions are rarely followed by complications. It is therefore useless to add to our nomenclature.

P. Dubois, Cazeaux, Chailly, Jacquemier, and Pajot recognize two lateral or parietal varieties for the cranium, one frontal and one occipital. Cazeaux describes them in an article, "Fœtal Obstruction and Difficulties," along with inclined positions of face and breech. Joulin describes inclined or irregular vertex presentations only with the frontal and parietal varieties. He ignores irregularities of other presentations, rightly remarking that the occipital variety is none other than the regular position of the vertex, and that the frontal variety of the vertex has been confounded with the frontal variety of the face, existing whenever the latter has not undergone its utmost degree of extension. As regards diagnosis, therefore, we have only to make right and left parietal varieties and a frontal variety.

## ART. II.—FREQUENCY, CAUSES, DIAGNOSIS, AND PROGNOSIS OF PRESENTATIONS AND POSITIONS.

§ 1. VERTEX PRESENTATION.—This is by far the most frequent. In 2,020 cases of Dubois, 1,913 were vertex presentations, *i.e.*,  $94\frac{7}{10}$  per cent. Of these 1,913, 1,367 were left occipito-iliacs and 546 were right-occipito-iliacs.

Of the 1,367 left occipito-iliacs, L. O. A. occurred 1,355 times, *i.e.*, in  $99\frac{1}{10}$  per cent. In the 546 cases where the occiput was turned to the right, R. O. P. occurred in 491 cases, *i.e.*, in 89 per cent.

Other positions are far more infrequent.

*Causes.*—The causes of vertex presentation are those determining the attitude of the foetus within the womb, viz., *accommodation*. The great frequency of L. O. A. and R. O. P. is due to the presence of the rectum upon the left side; and the weight of the posterior half of the foetus prevailing over that of the anterior half forces this part to turn toward the most sloping surface, i.e., toward the anterior abdominal wall, hence the great frequency of *left occipito-anterior positions*.

*Diagnosis.*—Vertex presentation is recognized before birth by the large, round, smooth surface which sometimes reaches the floor of the pelvis. All other parts are less resistant, smaller, and less accessible to the touch. Upon auscultation the foetal heart is heard below the umbilicus—to the



FIG. 45.—First Position of Vertex.

right or left according to the position. On palpation the examination is made (as described by Pinard) by placing the hands two or three inches to the right and left of the median line, the finger-tips corresponding to the anterior pelvic arc, and depressing the abdominal walls from above downward and from before backward, pushing down behind the rami of the pubis. In this way we can make out whether the true pelvis is full or empty. In the former case the chances are in favor of a vertex presentation. Palpation of the abdomen will complete the diagnosis by recognition of the foetal trunk. Moreover, of the five foetal parts

which may present before labor,

the vertex alone engages at the end of pregnancy in the majority of cases, and this, it may be mentioned, dispenses with many details as to diagnosis of the presentation by means of palpation.

During labor the finger feels a spheroidal hard tumor already in the cavity or at the superior strait, presenting above, and from before backward a membranous space, the *sagittal suture*. The direction of this suture and the site of a fontanelle, which we necessarily reach by following it, will enable us to appreciate the position. During labor palpation will enable us to obtain only uncertain data.

1. *Left Occipito-Anterior.*—The occiput, represented by the posterior fontanelle, corresponds to the left ilio-pectineal eminence, the forehead to the right sacro-iliac symphysis. The sagittal suture runs in the direction



of the left oblique, the anterior fontanelle being behind and to the right. The back of the fœtus looks forward and to the mother's left; the sternal plane backward and to the mother's right. The right side looks forward and to the mother's right; and the left side back and to her left. The maximum intensity of the heart-sounds is in the left iliac fossa, in the centre of a line drawn from the umbilicus to the anterior superior spine of the ilium.

On palpation, if the vertex is found engaged, it must not be forgotten, as Pinard states, that the "tumor of the head is always more accessible, more projecting upon one side than the other, . . . and the most projecting, accessible, and prominent part of the cephalic sphere is the frontal region." Now, in L. O. A. the tumor of the head is most easily reached at the right, the palpating fingers penetrating deeper upon the left side. This, with other data furnished by palpating the upper part of the abdomen, and with auscultation (if the fœtus is alone) will prevent any error.

2. *Right Occipito-Posterior*.—In this position the posterior fontanelle corresponds to the right sacro-iliac synchondrosis, and the dorsal plane of the fœtus looks backward to the right. Palpation—same as above. Tumor of the head more easily reached at the *left*.

The forehead corresponds to the left ilio-pectineal eminence; the sternal plane looks forward and to the left. The sagittal suture runs the same as in L. O. A.; but the finger touches the anterior fontanelle in the region of the left acetabulum. The maximum intensity of the fœtal heart is in the right iliac fossa at a point similar to that in L. O. A. If the finger cannot reach the posterior fontanelle, the anterior and the direction of the sagittal suture will indicate where the occiput probably lies.

3. *Right Occipito-Anterior*.—The occiput here corresponds to the right ilio-pectineal eminence, the forehead to the left sacro-iliac synchondrosis. The back looks forward and to the right, and the anterior fœtal plane backward and to the left. The left side looks forward and to the left; the right, behind and to the right. The heart-sounds, very loud, are heard in the mesial line, and at times to the left of this line. On palpation the hand sinks deeper on the right than on the left.

4. *Left Occipito-Posterior*.—The occiput and the posterior fontanelle correspond to the left sacro-iliac synchondrosis, the forehead with the right ilio-pectineal eminence. The dorsal plane looks back and to the left; the abdominal plane forward and to the right. Upon supra-pubic palpation the hand sinks deeper on the left than on the right. The sagittal suture is parallel to the right oblique, and the anterior fontanelle is near the right cotyloid cavity. The heart-sounds are feeble, and are heard in the left iliac fossa, sometimes in the right. Clinical experience frequently confirms the brilliant researches of Ribemont regarding transmission of heart-sounds.

5, 6. In the two *occipito-transverse* positions, rare during pregnancy in a normal pelvis, the occiput is either in the centre of the innominate line at the left, or at the right. The sagittal suture runs transversely. It is oftentimes difficult to reach the fontanelles; but the direction of the suture, and auscultation (which will discover heart-sounds in the right or left iliac fossa, according as the dorsal plane of the foetus is at the left or right), will suffice to establish the diagnosis of the position. In every vertex position palpation will, of course, discover the breech in the fundus uteri, now to the right, now to the left, according to the position of the vertex.

*Difficulties in Diagnosis.*—It may be difficult to make out a position on account of (1) deformities, (2) height of foetal part in the abdomen, and (3) irregularities in presentation.

1. In a narrow pelvis the head is elongated from uterine action, and the parietal bones override each other. Hence there forms a swelling, or sero-sanguineous tumor, corresponding to the os internum, thus preventing direct touch. In such cases the finger must be introduced between the

foetus and the pelvis to feel the form of the head elsewhere than at the region of the tumor.

2. In a constricted pelvis, or when the foetal head is immense, or again when some part presents *with* the head, the foetal mass may remain high up for a considerable time. When the orifice is not dilated, a precipitate labor need not be feared, and in such a case we may wait. Should the orifice be dilated, however, we *must* make out the presentation, if not the position. To do this, after having brought the woman to the edge of the bed, introduce the whole hand to establish the diagnosis.

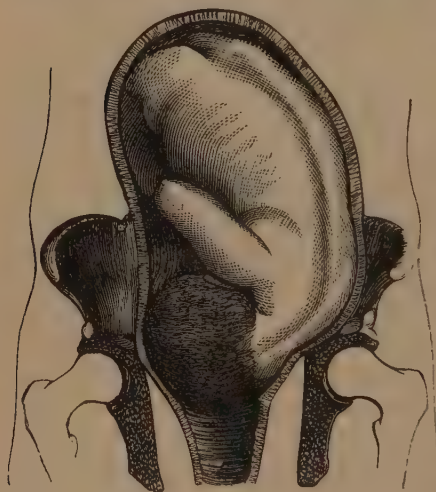


FIG. 46.—Irregular Vertex Presentation; Left Parietal Variety.

Palpation is also difficult in deformed pelvis. Indeed when the head is the lowest foetal part it engages but slightly, or not at all; and in either instance it is flexed very slightly. But, says Pinard, it is still possible to make out the forehead from its prominences, elevation, and hardness, and as in these cases the position of the head is *transverse*, the resisting plane of the foetus looks directly right or left, according to the respective position.

The difficulty is still greater when there is marked anterior obliquity of the uterus.

In such cases the head—engaged in the pelvis—is difficult to recognize, if we do not take the precaution to examine the abdominal walls to seek those distinguishing points already referred to. If the hand be carried toward the fundus, no foetal extremities will be felt. The breech is on a level with, or above the side of one of the iliac fossæ, where the cephalic tumor can also be most readily reached, and the feet are oftentimes found a short distance above the forehead (Pinard). The resisting plane runs transversely.

The foetal trunk, bent into an arc of a circle, and surrounded on all sides by liquor amnii, easily becomes a source of error, if one forgets that law of accommodation peculiar to the uterus.

3. Difficulty in diagnosis may again occur from impossibility in reaching the distinguishing landmarks which touch usually discovers. Since this change in location may become a source of error, this is the place to mention the three varieties of inclination which, with Joulin, we recognize.

First, concerning the two parietal varieties, I shall recall what I have said already in an article upon inclined position (*Gazette des Hôpitaux*, June 2, 1866). At the commencement of labor we feel, per vaginam, a hard, smooth, unbroken mass under the finger, without sutures or fontanelles. This tumor is high up, very far from the centre of the strait, and the cervix dilates very slowly. The finger touches either the ear (as in the second of my recorded cases, *loc. cit.*), the angle of the jaw, the fronto-parietal or the lambdoid suture, according as the head is more inclined toward the side of the face or toward the occiput. The ear being the part oftenest felt, as Jacquemier rightly states ("Manual," vol. ii., p. 68), we can by this means determine the position. The convexity of the helix is always turned toward the occiput, the lobe toward the trunk, and the tragus indicates the anterior plane of the foetus, whence we discover the inclination of this plane to the mother's pelvis. (See two cases of my own and one of Birnbaum's (Bonn), quoted by Dr. Modoléa: "Des Présentations Inclinaées de l'Extrémité Céphalique," Thèse de Paris, 1873; also, *Gazette Obstet.*, 1874.)

In the frontal variety the diagnosis is generally easier. The finger reaches the anterior fontanelle, which might cause us to mistake it for an occipito-posterior position. But careful exploration will show the practitioner that the head is not completely flexed, and that it is movable; and since, too, the foetal heart will be heard in the iliac fossa, corresponding to the left side of the foetus, the variety of inclination can readily be made out. This, as already stated, is the same for vertex as for face.

Finally, the progress of labor is scarcely modified by these irregularities; and later on we shall indicate the circumstances under which it is proper to interfere when the head cannot engage from the effort of nature alone, a condition that is, however, rare.



*Prognosis.*—Vertex presentations are the most favorable of all. Occipito-anterior are more favorable than occipito-posterior positions.

In the latter the head is elevated during the first stage of labor, flexion is not well marked, and descent is hardly completed until the occiput has swung forward, after a (comparatively) long journey and one that was performed quite slowly.

If this rotation does not occur, the occiput remains behind, the head suffers extreme flexion, and the occiput does not receive these expulsive efforts which the spine transmits to it, except in a curved line, which, of course, thereby diminishes their force. Hence the head remains for a considerable time in the pelvis, suffers compression, and, in time, compresses the adjacent parts. Rupture of the perineum is here scarcely avoidable; the condition is embarrassing and unfortunate for both mother and child.

§ 2. FACE PRESENTATION.—When the head presents at the superior strait it may happen that it is turned backward upon the dorsal plane of the fœtus. This extension causes a face presentation, which, however, is very rare, statistics showing that it occurs once in 250 cases (Stoltz). Pinard even doubts its existence as far as concerns *primary* presentation.

However this may be, as in vertex presentations so here, the occiput is usually forward and to the left. If now we picture the extended head, the chin corresponds to the right sacro-iliac synchondrosis. This is the usual position, statistics indicating it in the proportion of 31 in 41.

As to transverse presentations—regarded by some as the most frequent—they are oftenest merely secondary positions, *i.e.*, occur after uterine contraction has commenced acting upon the fœtus.

*Causes.*—The causes are often obscure. We can often attribute face presentations to obliquity of the womb, though Joulin does not recognize this cause. Narrowing of the pelvis also predisposes to face. Baude-locque ascribes it to abnormality in the direction of uterine contraction, but this only explains secondary positions.

Pinard believes that diminution in the length of the longitudinal diameters (“bullet-headed” children) predisposes to transformations of vertex into face presentations *within the pelvic cavity*, *i.e.*, during labor. This is possible, but *very* rare. Tarnier regards multiparity as predisposing to it in some instances.

In face presentations there are more male than female children; this Hecker explains in the greater weight of the former. Indeed, Pinard found that the least weight of children presenting the face was about 100 gram. (1,544 grains) greater than that of children presenting the vertex. The dolichocephalic head also predisposes to face presentations.

*Diagnosis.*—Face presentation may be suspected when, before rupture of the membranes, the presenting part is difficult to make out. If the amnion is flaccid or has ruptured, all the characteristic points of “face”



will be made out: forehead, nose, mouth, and in certain cases movements of the tongue (not to be mistaken for "sucking") are plainly felt. In mento-anterior the chin is felt behind one of the acetabula. With these data the position is easily decided; but it is necessary to clearly make out the direction of the nostrils, turned of course toward the chin, which, as we know, is the landmark on the fœtus, and the part that should first engage beneath the symphysis pubis in all—even the posterior—positions of the face, spontaneous parturition being possible only under these conditions.

The rarity of face presentations before labor—if indeed they ever exist—has prevented Pinard, who has studied this subject, from formulating anything regarding the diagnosis of these presentations by palpation. Inasmuch as he examined women *during* labor only, palpation was not very important, since touch can then usually be practised directly upon the fœtus itself.

But at the commencement of labor, when the fœtal parts are still inaccessible, palpation may be of some service, as we shall see further on.

We will study the attitude of the fœtus in the two most frequent positions of the face only.

1. *Right Mento-Posterior*.—In every face presentation manual exploration discovers a large tumor which at the commencement of labor is above the superior strait. This tumor only fills half the pelvis, when it is partially engaged, and the accessible portion of the head and the resisting plane (formed by the back) are turned to the left. The breech is felt near the fundus. The chin is in the right synchondrosis; before the escape of the bag of waters, the head being but moderately extended, the forehead will occupy the centre of the superior strait. When the liquor amnii—of which there is a large quantity—escapes, extension becomes complete; the occiput touches the nuchal region and the forehead is just behind the left acetabulum. The dorsal plane of the fœtus looks forward and to the left, the sternal plane behind and to the right. The right side looks forward and to the right; the left, behind and to the left. The heart-sounds are heard, as in the first position of the vertex, at the left of the abdomen, when (Depaul) "the back of the fœtus transmits the heart-beats to the ear of the listener."

2. *Left Mento-Anterior*.—Upon palpation in this position the accessible portion of the head, with the back, is found directed to the mother's right.

According to Budin, in face presentations we can sometimes feel upon the side opposite the cephalic tumor a projection something like a horse-shoe clearly marked out by the lower jaw and chin. The last-named corresponds to the left ilio-pectineal eminence at the commencement of labor, the bregma to the right sacro-iliac synchondrosis, and the forehead to the centre of the strait. When extension is completed the parts become more accessible; the chin engages, and is found behind the left acetabulum, the

forehead rises toward the right sacro iliac synchondrosis, and the bregma disappears. The face then looks straight down into the pelvis. The sternal plane looks forward and to the left; the back is turned backward and to the right. The heart is feebly heard in the right iliac fossa (Depaul), at the left (Ribemont), or in front (Tarnier). These differences depend upon how the sounds are transmitted—now by the anterior plane, and again by the left side of the thorax rather than through the back of the child.

*Remarks.*—Several obstetricians, at whose head stand Depaul, Stoltz, and Joulin, always regarding the frontal region as the most inclined, give

to face positions such names as *left anterior fronto-iliac*, *right posterior fronto-iliac*, etc.

This nomenclature is simple and convenient, since it does not reverse the order of frequency established for vertex presentations ("Nouv. Dict. de Méd. et de chir. Pratiq.," p. 250), yet it is not accepted by the majority of obstetricians.

"However," says Stoltz (p. 251), "the head does not engage in the inferior strait by the forehead but by the chin."

Now since the chin, in the same way as the occiput in vertex cases, is the part first to engage underneath the symphysis pubis, and since it is, besides, the main landmark for face presentations, is

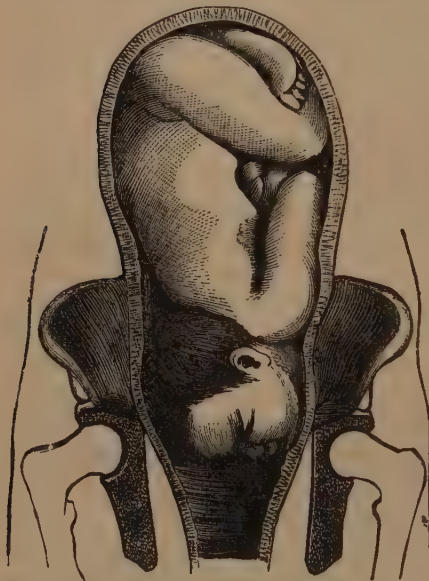


FIG. 47.—Second Position of the Face.

it not more logical for us to keep the names *right-mento*, *posterior*, etc., with Dubois, Cazeaux, Pajot, and so many more masters in our art?

*Difficulties in Diagnosis.*—When at the commencement of labor the forehead alone is accessible to the touch, the face is often mistaken for the vertex; but carrying the finger very high the root of the nose may be felt, and alongside this two little "softish" tumors surrounded by a bony rim—the eyes. At the other extremity of the forehead the anterior fontanelle is felt, and when the head is low down an ear may lie behind the pubis.

When the membranes have been long ruptured, a sero-sanguineous tumor appears in the face and so deforms it that it may be mistaken for the breech. In some cases even seeing the part will not enable us to recognize what presents, so great are distortion and ecchymosis. In incomplete extension we have a frontal variety whose characteristics are the same as for the frontal variety of vertex (*q. v.*).

*Prognosis.*—If in diagonal mento-anterior positions spontaneous delivery is impossible until the chin swings forward, this rotation is quite as indispensable in mento-posterior cases, for the neck (which is only 40 to 55 mm. long,  $1\frac{3}{8}$  to  $2\frac{1}{4}$  in.) is in contact with the posterior wall of the pelvic cavity (measuring 11 to  $13\frac{1}{2}$  ctm.,  $4\frac{3}{8}$  to  $5\frac{3}{8}$  in.), which wall is further increased by the whole length of the distended perineum. The face cannot descend to the floor of the pelvis in this position, therefore, unless the chest engages at the same time—an impossibility with a foetus at term, in a pelvis of ordinary capacity. The chin must therefore swing forward; but this reduction is rare, difficult, and slowly accomplished, from the extensive movements of rotation that it necessitates. Hence the prognosis is less favorable both for mother and child than in chin anterior face positions, which differ from those of the vertex only in the slowness in dilatation of the cervix and in the expulsive forces that act during flexion, and engagement here bearing upon an arm of a lever bent almost at an angle of  $90^\circ$ , all inducing tedious labor and delivery. Still I have seen several mento-anterior presentations terminate in six to eight hours in primiparae. Things are quite different when the chin is behind. The *Gaz. Obst.* published (1874) two cases of spontaneous reduction in mento-posterior positions. So the young practitioner must not be too fearful of such a position, nor interfere too quickly before it is certain that the contractions are insufficient.

There is another reason rendering face presentations dangerous to the child—the neck may be compressed so that cerebral congestion or even apoplexy results at the very moment it emerges from the os externum and comes under the symphysis pubis.

§ 3. BREECH PRESENTATION.—The breech or pelvic extremity of the foetus may present in three different ways, which in older classifications constitute as many presentations. (1) The pelvis may engage when the thighs are flexed on the abdomen and the legs on the thighs; (2) and (3) when the feet or knees appear at the vulva, the lower extremities being swept down and extended by the rush of waters. It may happen, therefore, that the breech alone descends, the lower limbs being raised to the anterior plane of the foetus; that one foot or one knee may appear at the vulva, the other lower limb being extended along the abdomen (*étendu sur l'abdomen*).

These are all simply varieties of pelvic presentation, which is less frequent than vertex, but more common than face presentation.

In 2,020 cases (P. Dubois), 85 were breech presentations, *i.e.*,  $4\frac{1}{2}$  per cent. Of these 85, the buttocks appeared first at the vulval opening 53 times, the feet 26 times. The knees did not present. Lachapelle met with knee presentation only once in 3,445 deliveries. The order of frequency of different positions of the breech is the same as in vertex, the former being rather frequent in premature delivery and when the child is dead *in utero*.



*Causes.*—Breech presentations are generally attributed to the fact that the fœtus, being quite movable up to the eighth month, has had its head carried up into the fundus, and subsequently it has not been able to re-pass the transverse uterine diameters. A special conformation of the womb, rendering it larger toward its cervix, will also produce a breech presentation. Here again it is "*accommodation.*" In multiparæ breech is not frequent.

*Diagnosis.*—Breech will be suspected when, during pregnancy, palpation discovers the pelvic cavity to be empty. On the other hand we will find, above, a large extremity corresponding to the major pelvis, often in one of the iliac fossæ. Less frequently we will find smaller fœtal parts on a level with the superior strait. The heart-sounds are heard above the umbilicus of the mother; touch corroborates palpation, disclosing absence of a large, hard, rounded tumor which always occupies the superior strait in vertex presentations, and we usually encounter a glove-finger bag of waters. If the waters have escaped, a soft tumor will be felt, divided by a groove in which we may find anus and genitals. Finally the sacrum, and the coccyx, whose apex is against the side toward which the back is directed, will aid in defining the position more accurately.

The feet are recognized by the os calcis, by the unequal thickness of their border, the angle they form with the leg, and by the smallness of the toes which are parallel. The right is distinguished from the left by paying attention to the relation of the internal border and os calcis with the periphery of the pelvis. When this border is directed to the mother's left, and the os calcis forward, it will be the *left* foot. And it is the same when the heel is behind and the internal border to the right.

If the os calcis is in front, and the internal border to the right, or the os calcis behind, with the internal border looking to the left of the pelvis, it will be the right foot; as also when the os calcis is turned toward the left or right half of the pelvis, and the internal border is respectively in front or behind.

With the left foot the internal border looks forward or backward, the heel being in precisely the same localities as above. After having made out which foot we have, it is necessary to notice the direction of the toes to determine the position.

The knees are distinguished by one or two hard, roundish little tumors, above which lie the folds of the hamstrings, and the legs and thighs that may be followed upward therefrom. The crests of the tibiæ will decide the position. The patella cannot always be felt, for when the leg is flexed on the thigh it will disappear, or at least reach the level of the inter-articular space, and become then immovable.

*First Position: Left Sacro-Anterior.*—In this, the analogue of L. O. A., the dorsal fœtal plane looks forward and to the left; the ventral, back and to the right; the left side looks forward and to the right; the right side,



back and to the left. The heart-sounds are heard above, or on a level with the umbilicus, for the breech does not engage in the cavity as readily as the vertex.

The foetal mass remains high up in the abdomen for a long time, and the cervix dilates *very* slowly. The bag of waters is large, ruptures spontaneously, and often just as labor commences.

Palpation discovers the left iliac fossa to be filled by a large irregular mass, with which are, or are not, smaller prominences. The head is in the fundus, sometimes superficial, but oftener covered by the liver.

By touch we feel the apex of the coccyx pointing back and to the right, the intergluteal groove starting from this point, and in it is the anus whose sphincter is hard to pass unless the child is ill or dead.

Meconium does not indicate illness of the child, unless present in large quantities.

Finally, at the end of the intergluteal groove, *i.e.*, toward the right sacro-iliac synchondrosis, the genitals are felt; and when presentation of the breech is complete, the site of the lower limbs is made out.

It is well to state that the prominence of the labia majora in female infants, and the congenital length of the clitoris may lead to error in the diagnosis between the sexes.

*Second Position: Right Sacro-Posterior.*—To avoid repetition, we will merely state that here the dorsal plane looks backward and to the right, like the breech itself; the smaller foetal parts are felt to the left and in front; the head is in the fundus and much easier to discover than when turned to the right. The abdomen looks forward and to the left; the right side forward and to the right; the left, back and to the left. The heart-sounds are heard above, or on a level with the umbilicus, on the *right* side. The apex of the coccyx is directed forward and to the left, and from it, parallel to the left oblique, starts the intergluteal groove. The lower limbs are recognized by characteristics already named.

*Difficulties in Diagnosis.*—In complete breech presentations there are scarcely any difficulties, owing to facility in digital touch. But it is dif-



FIG. 48.—First Position of the Breech.

ferent with incomplete presentations, for we must then make out the precise part. When the *buttocks* present, besides what has been said of complete breech, the finger does not make out the pelvic members all crowded together about the breech. When, as rarely happens, the *knee* presents, a round, hard tumor is felt—above which is the popliteal fold—continuous with both leg and thigh. The rarity of this variety is so great that, if manual touch is not practised, the diagnosis cannot be established.

When the *feet* present, the chief difficulty consists in distinguishing them from the hands, when the former arrive at the superior strait or appear in the vagina. In the leg the foot forms almost a right angle with the tibia, an angle open in front (yet not very markedly in the foetus), while behind is felt the calcaneum. The chief point is the difference in length of fingers and toes, and above all the size of the thumb, which is not upon the same plane as the rest of the fingers. The thumb also makes a motion of *opponating* (*opponens pol.*), when the foetal hand makes an effort to grasp the examiner's finger. Besides, the hand is a sort of continuation of the long axis of the forearm, and shows nothing comparable with either malleolus or calcaneum.

Besides, if the cervix were dilated and the member hung into the vagina, if doubt remained, we have (P. Dubois) but to pull on the part and inspect it, without fear from the disclosure of an arm, the recognition of which would remove all uncertainty. It may happen, on auscultation, that heart-sounds heard at, or above, the umbilicus belong to a vertex presentation.

When the pelvis is narrowed, and the vertex does not engage at the end of pregnancy or during labor, confusion may arise. But palpation, touch, and chiefly manual touch, will always clear up doubts.

*Prognosis.*—Breech deliveries are less favorable than vertex, and foot or knee delivery still more unfavorable than the buttocks, for the former do not readily adapt themselves to the lower segment of the womb, dilatation of the cervix is slower, and labor more painful.

Furthermore, uterine contraction in these presentations is already partly exhausted when it should be at its maximum in order to expel the head. The slow labor is often followed by foetal asphyxia, either from compression of the cord by the cervix against the body of the child, especially when the lower limbs are extended; or from retraction of the uterine walls, inducing embarrassment in the entero-placental circulation; or, finally, from premature separation of the placenta, an accident all the more to be feared since the uterus, after expulsion of the trunk, can very readily, by its contraction, detach the placenta. In spite of this, although much more serious for the child than head presentations, breech is yet less dangerous than face. D. Dubois states that one out of every eleven dies. Concerning the mother, breech presentations are also much more favorable than face, and perhaps more so than vertex presentations.

[We cannot believe that in breech cases the prognosis to the mother is as favorable as in vertex presentation, the risks of cervical and perineal lacerations being decidedly greater. The delivery of the head—large and unyielding as compared with the rest of the body—is sought to be accomplished with great speed, there having been but little preparation of the maternal soft parts, of that gradual character so desirable. These structures, therefore, often sustain unavoidable injury.—Ed.]

§§ 4, 5. TRANSVERSE PRESENTATIONS; LATERAL PLANE PRESENTATIONS.—Transverse presentations are, excepting face, the rarest. According to Lachapelle, they occur once out of 230 cases. According to the same authority, the right lateral plane presents more frequently than the left; but in each the back is turned forward oftener than backward.

When, in a presentation of a lateral plane, the foetus is markedly turned upon its posterior plane, simplicity of classification and ease of manipulation demand that we do not make it a special presentation, as Baudelocque has done, for whom such a position would be ventral; this author, also recognizes a dorsal position.

These two positions are, to-day, both embraced in the right and left lateral plane positions. The vertebral column behind, and the linea alba in front, bound in the foetus each lateral plane.

These presentations are also called the right and the left shoulder, since this, oftener than any other part of the lateral planes, presents at the superior strait.

*Causes.*—These presentations are usually regarded as caused by a small foetus, by accumulation of liquor amnii, by obliquity of the uterus, and by deformities of the superior strait.

Abnormal implantation of placenta, and predominance of the transverse over the longitudinal diameter of the uterus, have also been regarded as causes of shoulder presentation. Physical shock and irregular contractions have been adduced as causes. Certain it is that in multiparæ whose uterine and abdominal walls have been distended by previous pregnancies and no longer possess sufficient resistance to maintain the foetus in the vertical position, transverse presentations are more frequent. Pinard's statistics on this subject give the proportion as 7 to 1.

In these cases it is the absence of the law of accommodation which permits of trunk presentation; while on the contrary, in those cases where the child always presents a shoulder in a regular series of deliveries, it is the law of accommodation which forces the foetus to adapt itself to the form of a uterus whose ovoid, instead of being vertical, is horizontal, or rather oblique; for absolutely transverse presentations only exist during gestation, and even then very rarely.

*Diagnosis.*—Negative signs furnished on touch may cause us to suspect a lateral presentation, since the foetal mass, unable to engage, remains high up for a considerable time. Palpation gives us some data.



Before labor the pelvic cavity is empty, but palpation discovers a round, hard, often movable tumor in one of the iliac fossæ: the head. In the opposite fossa, higher or lower, is found the breech, sometimes masked by the false ribs, in the neighborhood of the liver, the spleen, or regions adjacent to either.

The resisting plane extends from one iliac fossa to the other, forming a curved line with its concavity uppermost. Above this plane and within its

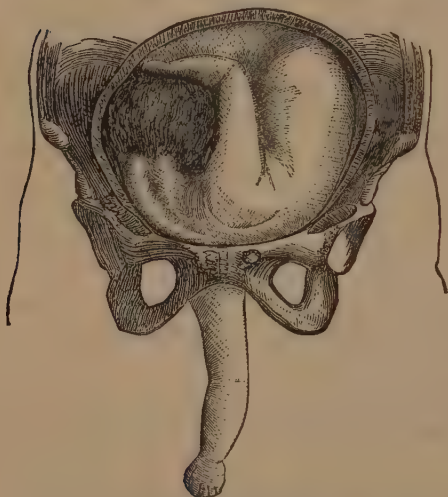


FIG. 49.—Second Position of Left Shoulder, with Extension of the Arm.

curve is the liquor amnii, and there may be felt the smaller foetal parts. The oblique position of the womb, and the hard tumor of the foetal head in one of the iliac fossæ, confirm the diagnosis. Auscultation elicits unsatisfactory results during gestation unless the dorsal plane is in front, when the heart-sounds are transmitted along an almost transverse line in the infra-umbilical region; while during labor the line of audition becomes more and more vertical.

Slow dilatation of the cervix and premature escape of the bag of waters are unimportant events here.

After rupture of the membranes we can recognize :

1. The *shoulder*, by a hard, round tumor above which is a bony projection, the acromion; by the external end of the clavicle, by the axillary border of the scapula, and by the intercostal spaces. The position may be determined by the direction of the axillary fold, which must not be mistaken for that of the elbow. The summit of the axillary space is always turned toward the head. The scapula indicates the dorsal plane.

2. If the elbow presents at the superior strait, it will be distinguished by its three bony eminences and transverse fold. It is seldom that the finger is unable to separate it from the trunk, and then we nowhere feel the scapula but only the ribs, in both directions. The olecranon is directed toward the breech, when the forearm is flexed upon the chest.

After rupture of the membranes palpation gives important data. The foetus being compressed on all sides, bends upon itself (Herrgott), especially at the plane of the two extremities. The latter approach in the median line, the iliac fossa is filled by a hard, round tumor, the larger extremity has risen toward the fundus uteri, and the resisting plane is almost vertical. This is a step toward spontaneous version, which, however, is infrequent.



During labor palpation is almost impossible on account of the frequent contractions of the uterus. Hence we ought to employ touch instead.

3. Rupture of the membranes may sometimes extend and sweep the forearm down into the vagina or outside of the vulva. This extension may also arise from faulty manipulation.

In the former case *inspection* alone suffices for the diagnosis, for the back of the hand corresponds to the back of the foetus, and the thumb is turned toward the head.

But it may happen, from manipulation, that the arm becomes twisted; then, in order that this means of diagnosis may be employed, the palmar surface of the hand must be placed up high, underneath the symphysis pubis for example, and in this position the thumb of the foetus will always turn toward the same side as the shoulder which presents. Thus, for the right shoulder the thumb will turn to the mother's right thigh, and *vice versa*.

To find the situation of the head, push the finger up to the axillary fold, and then, imagining what is already known of the foetal position, the situation of the back will be exactly made out. So certain is this method of diagnosis that P. Dubois advises pulling upon the arm in all doubtful cases, not fearing that it may come out, as older obstetricians did.

Later on we shall see that protrusion of the arm offers no obstacle to podalic version.

*Prognosis*.—Since natural labor is quite possible in trunk presentations, we should study the prognosis in such a case, one which is denominated *spontaneous evolution*. (See Art. on "Mechanical Phenomena of Labor.") This natural result is so grave, however, for mother and child, that version is to be preferred, and another reason in favor of interference is the great rarity of spontaneous evolution. Hence the prognosis is common to and identical with the prognosis of podalic version.

## CHAPTER II.

### NATURAL LABOR.

#### ARTICLE I.—CAUSES.

It is a recognized fact at the present day that the foetus plays no active part in labor, and that the expulsion of the ovum is due to that organic contractility which the womb has acquired since gestation commenced, aided by pressure of the diaphragm and abdominal muscles.

The question we must consider is, therefore, What calls this contractility into play?

This contractility is present even in the non-gravid uterus, as is shown by certain pathological states of the organ, into whose details we shall not enter. Moreover, contraction is active during all gestation; true, it is feeble and insensible in most cases, yet it is quite manifest at times, as we shall demonstrate in the next article. Now, comparing the cervix uteri with the neck of the bladder (P. Dubois) or the sphincter ani, and the body of the womb with such a reservoir as the urinary bladder or rectum, it is readily seen how, from the expansive power of the ovum, the distention of the uterine reservoir being carried to the utmost, irritation of the lower part of the cervix follows and contractions are excited, just as a full bladder or rectum induces urination or defecation. This—Jones Power's—theory is recognized by P. Dubois.

Is not contraction simply due to reaction of the uterine walls when their distention has been carried beyond certain limits? Or, as Desormeaux believes, to a kind of conflict waged between cervical and corporeal fibres, a conflict wherein resistance of the cervix is vanquished by dilatation, and where corporeal contractions, latent till then, at last become manifest and strong enough to produce parturition?

Whatever be the cause bringing it into play, muscular contraction is the sole agent bringing about delivery. It acts during this whole period, it predominates over all other phenomena to such an extent that some would only see in the phenomena of parturition mechanical effects dependent upon that contraction. If this be apparently true, I think it is none the less necessary, for study and for the instruction of students, that we

separate the physiological from the purely mechanical phenomena of labor, as our masters have done before us.

Dr. Poulet (of Lyons), who has made a study of intra-uterine pressure as determined by that contraction, is the first Frenchman who has attained any satisfactory results, these being due to an ingenious little instrument he has made and which he calls the "*tocograph*."

These results were discovered by means of tracings which enabled him to follow the slightest variations of uterine pressure during the whole period of labor, and are fully given in Delore and Lutaud's "*Traité d'Accouchements*."

Dr. Polaillon, who repeated Poulet's experiments, estimates the tonicity of the womb, exclusive of contraction, as 66 kilogram. 150 grm. (145½ lb. 5¼ oz. avoirdupois), while during a contraction it is 88 kilogram. 244 grm., the latter being on an average only 194 lb. 8½ oz.

Adding (Delore) the figures of the tonicity and those of contraction, we obtain an average intra-uterine pressure during labor amounting to 154 kilogram. 394 grm. (339½ lb. 13¾ oz.), to which should be added pressure from abdominal muscles in order that the true sum total of expulsive forces may be given. This expulsive force varies with the individual and with attendant circumstances.

[Other theories which have been advanced regarding the cause of labor are ovarian stimulus at the menstrual anniversary nearest period of foetal maturity; fatty changes in secundines, more particularly in the placenta; a condition of the blood surcharged with carbonic acid.—Ed.]

## ART. II.—PHYSIOLOGICAL PHENOMENA OF LABOR.

These are five :

1. Contractions.
2. Pains.
3. Dilatation of cervix.
4. Formation and rupture of the bag of waters.
5. Secretion of glairy, bloody mucus.

§ 1. CONTRACTIONS.—In large works on obstetrics premonitory symptoms of labor are described, but except falling of the uterus, which eases respiration while it produces uneasiness in the hypogastrium, all other prodromata are due to contractions acting either in the first or second stage of labor.

Contractions—very different from pains—occur before the latter, and the first stage of labor is often marked by *painless* contractions, which, short and infrequent at the beginning, grow longer and more frequent, preparing the woman for painful contractions.

These painless contractions efface the cervix and prematurely dislodge the placenta when the latter is implanted over or near the os internum.

These contractions may be felt by placing the hand on the abdomen of the mother over the uterine sphere, which can be felt to increase in hardness intermittingly. In multiparæ the membranes are felt to bulge and partially engage in the cervix during a contraction when vaginal touch is practised. Millot calls these contractions the "secret, latent stage of labor." The interval between contractions is irregular and varies from a multitude of causes. In physiological contraction the whole womb participates, and the membranes become tense; and the time can be foreseen when contractions will become painful by the finger in the cervix recognizing that the membranes bulge. This depends on contraction alone, yet in a few moments the woman will be in pain—another proof of the independence of pain and contraction. Contractions extend from behind forward and from above downward. If pressure be made on the abdomen in the interval, no pain is thereby induced.

§ 2. PAINS.—Four varieties of pains were recognized of old—premonitory, preparatory, expulsive, and crushing.

The premonitory were the very first that occurred, and were quite infrequent; to-day they are looked upon as part of the preparatory pains.

Similarly the expulsive pains are embraced in what were called the crushing or pounding pains, due to the passage of the fœtal head when it escapes from the vulva.

Preparatory pains last until the cervix is completely dilated, and belong to the first stage of labor. During a contraction the woman instinctively bends and twists so as to change the direction of the uterus; she leaves unfinished the sentence she began, and when pain ceases recommences her conversation. During a pain she utters a plaintive little cry, likened to that moaning cry of the bakers. ["*Cri du geindre des boulangers*;" the boys who leave the bread at the door in Paris have a doleful short cry.—Tr.] At the close of these "preparatory" pains there may be a mild delirium, and the mind is always depressed.

Expulsive pains do not last as long, viz., only from dilatation of the cervix to expulsion of the fœtus. The cries during these pains are characteristic, and to the trained ear they are distinguishable from the street, especially when the head clears the vulva.

All these pains, however, are not present in the same degree; their intensity varies according to the sensibility of the patient, and if some can scarcely endure the pains of labor, others undergo parturition with indifference (Panis, "*Thèse de Paris*," 1861), and even during (a healthy) sleep! This can be made an excellent argument for the use of chloroform in physiological labor.

*Fulse pains* do not accompany contractions, but are usually stationary and permanent; they are felt in the hypogastrium or about the navel, and in nowise hasten labor. To treat them we must discover the cause.

Pains in the loins likewise occur with labor, from compression of the



sacral nerves. Similar compression induces cramps in the legs, which delivery alone will relieve.

§ 3. DILATATION OF THE OS.—The researches of Braune (Leipzig, 1872), and the more recent investigations of Bandl and Martin (Stuttgart, 1876, 1877), prove that the cervix shortens during the last two or three months of gestation, forming, with the lower segment of the uterus, “Braune’s canal.” At the close of pregnancy the cervix does not constitute the whole of this canal; and at the commencement of labor, in primiparæ, the cervix comes to a little point, where, as in multiparæ, the os is as large as a fifty-centime piece [a little larger than our silver dime].

In primiparæ, especially when version is performed or deep touch is practised, a kind of circular ring is felt, separating Braune’s canal (whose walls are thin) from the corpus uteri, which has much thicker walls. This, Bandl’s ring, is in reality but the result of that resistance which differs so much in the body and in the *cervico-uterine canal*; when labor begins it soon dilates, along with the canal below it, and the orifice, which terminates all.

This dilatation may be as great as the pelvis itself (1) under the influence of uterine contractions; (2) from pressure of the membranes, urged on by the head, which engages like a coin in the internal orifice; the other fœtal parts being less adapted to assist dilatation, the orifice will, all other things being equal, open much more slowly under their pressure; (3) from the wetting produced by rupture of the membranes; and (4) by secretion of glairy, bloody mucus.

*Action of Contraction in the Orifice.*—The muscular structure of the fundus uteri, consisting of several layers of fibres, naturally predominates over that of the cervix, which only has circular fibres, and is therefore unable to counterbalance general contraction, especially in multiparæ, in whom, by the presence of old ruptures, there is rarely any cervical resistance, and whose cervices have already been dilated.

The cervical fibres having once given way, those of the womb, being more potent, dilate the orifice, which tends to rise up toward the fundus.

The more it dilates, the less force has the cervix to contract, hence more time is necessary for dilatation to reach the dimensions of a five-franc piece [our silver dollar] than is required for it to subsequently become complete. The proportion is three to one.

Example: In a primiparæ whose entire labor will last 12 hours, 9 hours will be required to dilate the cervix to the size of a silver dollar, and 3 hours to dilate it completely, so that the fœtus may readily be expelled.

In multiparæ the proportion is different; thus in a 3-hours’ labor, 2 hours and 50 minutes will be employed in dilating the os, and 10 minutes for expelling the child.

There are many exceptions to this rule, and Pajot, in his lectures, gives many instances where, in a 74-hours’ labor, 73½ hours were for dilatation,

and 30 minutes for expulsion. In 1,000 cases 12 hours were demanded, on the average, for dilatation. In 2,339 cases the whole time of labor was: In 1,168, between 1 and 6 hours; in 719, between 7 and 12 hours; in 124, between 12 and 24 hours.

In exceptional cases 20 women exceeded 24 hours. The longest time was 60 hours.

[The great diversity of opinion upon the duration of labor shown by writers may be attributed to the difference in closeness of observation regarding the first painful and regular uterine contractions.—Ed.]

Any deviation of the cervix may hinder dilatation, for then the engaging part presses against a point on the uterine wall whereon its efforts are all expended.

*Evidence of Dilatation.*—After a few hours of labor touch discovers, during a pain, a membranous, tense pouch, which is to be followed upward to its base, and there the thin uterine orifice is found. The pouch is as flexible as the fingers of good kid gloves, moist, and possesses no sensation except in pathological cases.

Touch may be indirect, the woman being erect or supine. But in the latter position the orifice is more easily reached, especially if it be directed posteriorly when labor begins. We find the anterior lip nearly always swollen and cedematous from pressure if the head lies against the pubis, instead of being thin, as we are in the habit of finding it. Toward the end of labor the cervix cannot be reached, for it surrounds the child's neck. When it is around the least advanced portion of the head it may still be reached by introducing the whole hand, as when we put on the forceps.

§ 4. FORMATION AND RUPTURE OF THE BAG OF WATERS.—This pouch is formed by the lower portion of the membranes, which are made up of more or less elastic tissue. The dilating orifice permits the passage of the liquor amnii contained in the ovum, this fluid seeking the lowest position and pushing out the membranes at the spot where they are not compressed by uterine contraction. The bag has, therefore, the form of the orifice itself, large when there is much dilatation, and corresponding to the amount of *liquor amnii* and the presentation that is dilating the orifice.

Thus in vertex, the waters are in a flattened bag; but when the pouch is long and "glove-finger" like, it is well to be suspicious of mal-presentations.

*Rupture of Bag of Waters.*—When the orifice is dilated nothing supports the membranes. Giving way to the pressure of the fluid they rupture during a contraction—which latter becomes more intense by very reason of that rupture—and a varying amount of fluid rushes away. Ribemont (in *Arch. Tocol.*, 1879) found, by means of a special self-registering apparatus, that with an orifice 10 ctm. (4 in.) in diameter the membranes ruptured under a mean pressure of 10 kil. 300 grm. (22 lb. 10½ oz. avoirdupois).

The amnion, when alone remaining, resists longer than either chorion or decidua alone, and this difference is represented by a force of 2,388 grm. ( $84\frac{1}{2}$  oz.) in favor of the first-named membrane. Sometimes rupture occurs most unexpectedly, or before dilatation is completed, thus rendering labor longer, and more dangerous for the child. It occurs usually with those presentations where the foetal part does not hermetically close the lower segment of the womb. There is, then, a large amount of water, and a large protruding bag. But it has also been found to occur—though very rarely—in vertex presentations, and even before any uterine contractions have been felt by the mother herself.

Finally, when the membranes are very thick and resistant, rupture only occurs when the head escapes from the vulva, and the child is then said to be “born with a caul.” A child is also born with a caul when rupture has occurred at a higher point than the space which corresponds to the cervix uteri.

Delayed rupture is undesirable: the least of its inconveniences being tedious labor. Hence it is better to rupture the membranes artificially when the orifice is sufficiently dilated, either with the finger-nail by scratching the chorion and thus weakening the bag’s resistance, or with a toothpick or point of a pen drawn over the bulging membrane during a contraction.

It is most useful to induce rupture when the cervix is completely dilated, for it is not impossible that the resistance of the membranes may lead to premature detachment of the placenta with its evil train of symptoms.

§ 5. *Secretion of Bloody, Viscid Mucus.*—The plug is made up of yellowish, albuminous clots, secreted by the vagina and the mucous crypts of the cervix during the last of pregnancy and the commencement of labor. The glairy mass becomes red and aids in dilatation of the orifice, also adding to the general relaxation of the vulvo-uterine canal. Blood is present in the form of streaks, similar to those in phthisical sputa; women then say that “they have a show.” Absence of this is a bad sign, for the parts are then dry and hot, almost verging on inflammation.



FIG. 50.—Formation of the Bag of Waters.



## ART. III.—MECHANICAL PHENOMENA OF LABOR.

The various movements executed by the foetus in the pelvis to accommodate its diameters to those of the pelvic cavity are independent of volition—dead or living, the foetal evolutions are identical, and are mechanical movements.

They vary according to the foetal part which presents, but they all tend to the same end ; and from direct observation we are able to compare them among themselves, and establish a general law applicable to natural labor for each foetal extremity.

To Pajot we owe the discovery that all deliveries occur according to one and the same mechanical law ; and that even in transverse presentations, rarely occurring spontaneous evolution (the only natural mode of delivery in these presentations) is governed by the same mechanism and obeys the same laws.

These laws do not hold in abortion.

The mechanism of labor has been divided into five stages, viz. :

1. Moulding of the parts.
2. Descent of foetal part as far as possible.
3. Internal rotation of the advancing foetal part so as to bring its largest dimension into relation with the largest part of the pelvis.
4. Expulsion of the foetal part that first presents.
5. Expulsion of the second foetal part.

The last stage is preceded by rotation, which has thrice been repeated in the pelvis. Tarnier recognizes a sixth stage, made by dividing the fifth. We shall come to this again when considering each presentation.

To these five stages belong the mechanism with each extremity of the foetus as the presenting part, and as each is considered we shall discuss the abnormalities that may occur with it.

§ 1. VERTEX.—(1) The stage of moulding is the period when flexion is occurring ; it is a substitution of diameters.

(2) Descent or engagement of the foetal part. The accommodation of foetal to maternal parts is here necessary.

(3) Internal rotation of the head whose occipito-frontal diameter corresponds to the coccy-pubic.

(4) Expulsion of the head is accomplished by a movement of extension forcing the occiput backward toward the foetal dorsal plane.

(5) External rotation of the head and internal of the shoulders. This being the occiput rotation brings the occiput toward that thigh of the mother nearest which it formerly lay. This is Bandelocque's old "restitution." Simultaneously the trunk is delivered. Tarnier subdivides the fifth stage into two parts : the first is internal rotation of trunk and ex-



ternal of head ; the second delivery of the foetus ; and thus he makes six stages in all.

In the *first stage* the chin approaches the chest, becoming flexed, and the foetus thus presents the vertex of the occiput which, engaging like a wedge in the lower segment of the womb, pushes before it the lowermost portions of the membranes and thus facilitates labor. There is, besides this, a greater or less overriding of the parietal bones.

In the *second stage*, should the parts be in accommodating relation, uterine contractions force the head to engage. This stage is of varying length, according to the size of the foetus, the energy of the contractions, the resistance of the cervix, and, above all, according as the woman is a multipara or nullipara. This stage ends when the head lies on the pelvic floor.



FIG. 51.—Engagement in the First Position of the Vertex.

In the *third stage* rotation, which favors the exit of the head, is not well marked in anterior positions, but is extensive in transverse, and still more so in posterior positions. In all instances the occiput swings under the symphysis pubis, unless there be abnormalities present. It was formerly believed that in persistent occipito-posterior positions the occiput turned into the sacral concavity following the direction of the posterior inclined plane. This, to-day, is regarded as an exploded notion, and the idea that the inclination of the posterior pelvic planes possess any influence is likewise discarded.

[While believing that the influence of the inclined planes is small as compared with the reflected perineal force and the law of accommodation, we think that the views of the author are too sweeping. There are those who believe that in some instances the inclined planes are distinctly influ-

ential in facilitating long rotation of the occiput forward, or, in other instances, in directing the occiput toward the sacrum. In this latter event it often happens that after descent of the occiput upon one of the posterior inclined planes, past the spine of the ischium, the reflected perineal force will finally direct the occiput beneath the pubes.—Ed.]

The third stage in vertex presentations, when parturition is normal, has been compared to the rotation of the egg within the oviducts of oviparous animals before its exit; or better still, to the rotation undergone by a lean foetus' head when compressed between the blades of a forceps. We

know that in such cases the head assumes a position where its longest diameter is parallel to the blades of the instrument. It has also been compared to an olive about to enter the neck of an upturned bottle.



FIG. 52.—Rotation Completed in the First Position of the Vertex.

Pajot explains rotation of the foetal head, likening the movement to the efforts of an urchin trying to push his head through the bars of some grating. After many attempts the head is thrust through the

bars, being finally turned in the proper direction, and the body always follows. The head slowly executes its third movement, progressing at each contraction and then slipping back a little, progressing again, even perhaps beyond the symphysis, then slips back behind it, to again pass it by the same series of slight advances, reaching the situation which it must occupy before entering upon its fourth stage (*vide infra*). But the foetus does all this mechanically, in obedience to laws of which we are as yet ignorant.

*Fourth Stage.*—The head is extended, pushing the occiput toward the back, favoring its expulsion at the bregmatic, frontal, and mental diameters.

When the occiput engages under the symphysis, it is out of the pelvis. It is then that extension of the head begins, for it is now possible, as the symphysis is no longer an obstacle, and the movement from below upward occurs after the exit of the occiput, the diameters presenting being—in order—the suboccipito-bregmatic, the suboccipito-frontal, the suboccipito-mental, and the submento-occipital. Then the head will fall out from its own weight.

*Fifth Stage.*—There is external rotation of the head, with internal rota-

tion of the trunk. This movement carries the occiput toward one of the mother's thighs.

It is important that the primary position should be made out, for, if hemorrhage threatens, the obstetrician must induce this motion, and the occiput must be turned in the direction which it occupied before internal rotation commenced, or otherwise the child's neck will be twisted. True, this movement always tends to occur of itself, except when uterine contraction is absent, as when, after application of the forceps, the physician is forced to end the labor himself. While external rotation of the head is occurring, the trunk (within the pelvis) suffers corresponding rotation, carrying one shoulder forward and the other backward. To this shoulder movement—indispensable to their delivery—external rotation of the foetal head is due. Thus, imagine an L. O. A. position before rotation; during extension the shoulders are naturally in the transverse diameter of the pelvis, since the head has turned into the antero-posterior diameter. When the head is out the shoulders, to follow it, must turn so that the bi-acromial diameter corresponds to the coccy-pubic; then the right shoulder will move up under the symphysis, and the occiput will turn to the mother's left during delivery of the trunk.

This rotation is passive and more or less complete, and the expelled foetus may lie upon its side or on its back. Hence we can make a diagnosis of the primary position after delivery; still rotation of the shoulders has been seen to occur in the reverse direction.

*Sixth Stage* (Tarnier).—After the fifth stage the trunk is entirely within the genitals, and the mechanism of its expulsion therefrom should be briefly studied. The anterior shoulder first swings under the pubis and appears at the vulva; soon the trunk suffers a lateral motion, and the posterior shoulder advances, sweeps over the whole perineum and escapes from the vulva, while the anterior shoulder remains immovable under the pubis. Soon the trunk follows, and the superior portion of the back is very frequently directed obliquely, gliding against the internal border of one of the ischio-pubic rami. The remainder of the trunk to the hips has nearly always a spiral movement, but when the pelvis is out one of the hips usually corresponds to the pubis and the other to the perineum—always obeying, during labor, the law of accommodation.

This stage, then, is delivery of the trunk.

§ 2. DIAGNOSIS OF THE DIFFERENT STAGES; ANOMALIES ARISING FROM OBSTRUCTIONS OR DIFFICULTIES.—*First Stage*.—Touch recognizes the posterior fontanelle. The foetal heart is hard, as at the end of gestation. The foetal mass is still high up.

*Second Stage*.—The head can be more easily reached; we can feel the fontanelle, which, when primarily behind, begins to swing forward. At the end of this stage the head rests on the floor of the pelvis, and the heart-sounds are not as high up as before.



*Third Stage.*—Rotation is completed at the end of this stage; the fontanelle is quite high up, and the sagittal suture is perpendicular to the perineum. The heart-sounds are heard in, or near, the median line.

*Fourth Stage.*—The head extends; the vulva bulges forward; the perineum is distended; the labia majora are thinned, and the orifice widens under the contractions. The parietal eminences engage beneath the pubes and then the head is seen rising up to the vulvar opening, and extension is completed by the passage of the anterior fontanelle, forehead, face, and chin. When the chin is delivered the head falls.

*The Fifth and Sixth Stages.*—After a brief lull contractions begin again and the occiput looks toward one of the mother's thighs. Directly after comes delivery of shoulders and trunk in the longest diameter of the vulva. Expulsion may be so rapid as to be prejudicial to the child, especially if the woman is standing or lies at the edge of the bed.

*Anomalies Occurring in the First Stage.*—With a small foetus there may be no moulding of the parts; we then have a frontal variety of the vertex which would not readily engage when the foetus was of average size, since the occipito-frontal diameter, which then would present, is greater than the occipito-bregmatic, which is the presenting diameter when flexion has occurred.

*Anomalies in the Second Stage.*—These are but the number of hours

necessary for engagement; sometimes one hour, sometimes several days are demanded. But in all cases where there are no material obstacles, e.g., contracted pelvis, etc., this stage is always completed.

*Anomalies in the Third Stage.*—This stage may be wanting—a serious occurrence in the two occipito-posterior positions. The occiput failing to swing forward will always escape first, but at the



FIG. 53.—Occipito-Posterior Position. No rotation.

anterior edge of the perineum, which structure will then be in danger of rupture. This constitutes the secondary occipito-sacral position. Here the flexed head advances toward the vulva, which opens to engage the parietal eminences, and then the occiput clears the commissure, while the perineum glides upon the nuchal region, already delivered, the head suffering a quick motion of extension from above downward. The centre of



this movement being the nucha, the parts that appear under the symphysis pubis are, in order, the forehead, face, and the chin, which is the last out. This is an anomaly of the fourth stage, the consequence of non-rotation.

Finally, the *fifth* and *sixth* stages may be absent, even in primiparæ, and the delivery of the trunk follows no fixed law.

§ 3. FACE.—As in vertex, so in this presentation we make six stages in the mechanism of labor.

Face presentations are but vertex "extended," and the stages are (1) extension, (2) engagement, (3) internal rotation, (4) flexion or delivery of head, (5) external rotation of head and internal rotation of shoulders, and (6) delivery of trunk.

*First Stage.*—Extension may occur before the beginning of labor or after the first pains. In the former case it may be attributed to abnormal inclination of the uterus, to excess of liquor amnii, or to a small child, all of which may also give rise to inclined positions of vertex or face. In the latter case, bony resistance of a constricted pelvis, or resistance in the cervix perineum, especially in occipito-posterior positions, is sufficient to extend the head. We know that face presentations frequently occur with a deformed pelvis. Extension may be complete or incomplete. If complete, the occiput is carried on to the back of the foetus; another face presents the submento-frontal diameter, as a general rule, in the superior strait. This is most favorable for engagement.

If extension is incomplete it is the mento-bregmatic diameter that touch recognizes; and this measuring  $9\frac{1}{2}$  ctm. ( $3\frac{1}{2}$  in.), while the mento-frontal is but 8 ( $3\frac{1}{8}$  in.), engagement becomes more difficult. This is the frontal variety of face, and is almost exactly like the frontal variety of vertex where the head is incompletely flexed.

*Second Stage.*—This varies according as extension is more or less complete. When the chin is in the posterior half of the pelvis, engagement cannot occur; for the occiput being approximated to the back, the thorax must descend with the head into the pelvic cavity, an event not possible with a normal pelvis and child at term. Besides, the neck is too short to extend along the anterior surface of the sacrum and the distended perineum, for in face presentations the chin must be the first part born. The thorax not engaging after the neck will result in arrest in the process of delivery unless rotation occurs within the superior strait itself, an event which brings the chin in the transverse pelvic diameter, or in the vicinity of the ilio-pectineal eminence. Then engagement is possible.

*Third Stage.*—In anterior transverse, and even posterior positions, rotation brings the chin under the symphysis; then abnormalities of the second stage are corrected and labor goes on. Older obstetricians did not believe in this rotation in mento-posterior positions, and regarded interference as necessary. Direct observation proves that usually, owing to

rotation, natural delivery occurs in these face positions. When rotation does *not* occur, rotation of the chin forward may be produced by a couple of applications of the forceps.

*Fourth Stage.*—If in vertex, where the head is flexed, the fourth stage is distinguished by extension of the head, which facilitates its exit; in



FIG. 54.—Face Presentation. Secondary mento-pubic position. Beginning of flexion.

face presentations, where the head is already extended, exit of this part is produced by flexion, the centre of motion of which is the anterior part of the neck, so that the chin nears the chest or symphysis pubis, and delivery occurs by the submento-frontal, bregmatic, and occipital diameters.

*Fifth Stage.*—Same as in vertex, *i.e.*, the occiput turns to the side it first occupied, following internal rotation of the shoulders. Hence when we have to execute the fifth

stage ourselves, the occiput and not the chin is the landmark.

*Sixth Stage.*—As in vertex.

§ 4. DIAGNOSIS AND ABNORMALITIES.—Touch discovers the chin when it is turned forward, the nose if the chin is behind. In the latter case the canals of the nostrils look to one of the sacro-iliac synchondroses.

If the head is incompletely extended, the forehead and anterior fontanelle are felt.

It is during the period of “moulding” that extension becomes complete; if, from some abnormality, this stage is absent, the “frontal variety” of presentation results.

We can have definite knowledge of the case if the face engages, when the chin becomes transverse in mento-posterior positions, and when the face descends on the floor of the pelvis.

Lachapelle, who practised in a hospital where women were usually received after labor was in progress, found transverse positions of the face to be the most frequent, since she examined the patients during engagement, when the head had already experienced some rotation even at the superior strait. Authors who follow her have accepted her error. If the chin is primarily forward, engagement is easily diagnosticated, occupying a variable length of time.

The third stage is recognized by the chin, which touch discovers underneath the symphysis pubis. But, as in vertex, this stage may be absent,

constituting a very serious anomaly should the chin remain posteriorly. Interference is necessary, for reasons already given.

The diagnosis of the fourth stage is made, as it were, by our eyes—we only have to *look*. It is only absent when the third is.

The diagnosis of the fifth and sixth stages is made as in vertex (*q. v.*).

§ 5. BREECH.—The resemblances between all presentations will cause repetitions. Here again six stages are recognized.

1. Moulding of the parts by pressure.
2. Engaging of the presenting part.
3. Internal rotation bringing the back toward one acetabulum, one hip being high up and in front, the other lower down and behind.
4. Delivery first of the superior hip, then of the inferior, the anus being uppermost.

5. Internal rotation of head, and external of trunk, the occiput coming under the symphysis. Engagement of head. Depaul compares breech to three little vertex deliveries; we see the successive delivery of hips, shoulders, and head passing through the same stages as delivery of the occiput.

#### 6. Delivery of the head.

In the *first stage* the chin approaches the sternum from the pressure of contractions transmitted through the liquor amnii to the child. The lower limbs are flexed and the foetus occupies the smallest possible space.

The *second stage* varies. It is usually longer than in vertex, because the larger softer breech does not engage like a wedge in the cervix and force it to dilate. Besides, the membranes, which are extensive, rupture very early and do not aid in dilatation. When the lower limbs are extended the stage of engagement is still more variable, and these members aid still less than the breech in dilating the cervix.

In the *third stage* the back should never look quite forward. If this happened it would be necessary to swing it toward one of the iliac fossæ by a slow, twisting motion, so that the bi-trochanteric and bi-acromial diameters should correspond to the vulvar ellipse and to the coccy-pubic diameter.

Delivery of the trunk is aided by a movement of lateral flexion on the



FIG. 55.—Breech Presentation. Engagement of trunk.



part of the fœtus. The upper hip first comes under the symphysis; its fellow, urged by uterine contraction, sweeps over the anterior surface of the sacrum and perineum, which it depresses and distends. The lateral foetal region curves in, superiorly, and the posterior hip comes to the same level as the superior, which has continually though slowly advanced. The anus is uppermost. A band of meconium, often a spurt of urine, is ejected at this time. Lateral incurvation increases and the posterior hip comes out at the same time as, or a little before, the superior. Once the pelvis

is out the lower limbs are freed, but they still remain flexed and possess certain motions.

The trunk, still incurved, continues its onward progress; the thorax and arms (the latter usually approximated to the former) engage in the inferior strait; the uppermost elbow first appears, and the posterior is not long after, the vulva being dilated by the passage of the child's pelvis. The shoulders are delivered



FIG. 56.—Internal Rotation of Head and External Rotation of Trunk in Breech Presentation.

in the same order; often, however, the one that is posterior comes out first, although its fellow first appeared beneath the symphysis. When the shoulders are born the fourth stage ends; now follow the fifth and sixth.

A rotation occurs in the pelvis which brings the occiput under the symphysis pubis, the face being posteriorly and the chin remaining flexed. With this internal rotation of the head there occurs external rotation of the trunk, bringing the foetal back directly forward. The nucha, just under the pubic arch, becomes a fixed point; and the head, impelled by contractions, undergoes further flexion. The face glides over the perineum, and describing an arc of a circle, comes out at the posterior vulval commissure, the chin, forehead, bregma, and occiput successively appearing, the back of the fœtus being brought upward upon the mother's abdomen. Delivery occurs by the suboccipito-mental, suboccipito-frontal, and suboccipito-bregmatic diameters.

§ 6. DIAGNOSIS AND ABNORMALITIES.—By means of touch—aided by palpation and auscultation—the five stages may be diagnosticated as in vertex. Thus in the first stage the tip of the coccyx indicates the situation of the back; in the second, the foetal parts are more easily reached, and one of the buttocks descends into the pelvis.

The third stage is not so well marked, since the back is turned toward



one of the acetabula. Rotation is less complete, so that the heart-sounds are not loudest at the median line, unless it be a sacro-pubic position. In the fourth stage we can see appear, in order, at the vulva, the anterior, then the posterior buttock, the trunk, the anterior, and almost simultaneously the posterior shoulder. The fifth stage ends with rotation of the head (bringing forward the dorsal plane) and its delivery. Still, if the diagnosis be easy, abnormalities are more often met with than in other presentations. These arise from differences regarding the passage of breech, shoulders, and head through the pelvis.

*Breech.*—Moreau states that when the hips primarily correspond to the sacro-pubic diameter, they only become oblique in order to engage in the inferior strait.

If the sacrum points directly backward or forward, engagement may be attended by considerable difficulty, especially when there is no rotation, which should have brought the sacrum toward one of the acetabula. Lachapelle and Moreau both agree to interfere in such cases.

It may happen that the arms go up against the sides of the head, but this is rare when labor proceeds naturally. It is the same with extension of the head.

Under "Version" we shall describe what to do to engage the arms and head.

When the lower limbs go up over the anterior plane of the foetus (breech presentation) the mechanism is unaltered, and the prognosis is more favorable, as the cord is protected by these limbs. Engagement of one lower limb while the other remains upon the abdomen, and the different varieties of foot or knee presentations, do not in any way change the mechanism of labor.

But there are many anomalies in the passage of the head. In sacro-posterior positions, if rotation does not occur the occiput is behind, and the head may become flexed or extended. If traction has not been made the head is apt to be flexed, and we must then forcibly bend the trunk backward, so as to carry the back of the foetus toward the back of the mother; the head is successively delivered by the chin, forehead, bregma, and occiput. It is still a delivery by suboccipital diameters. But if, from traction, the head is extended (an event which will rarely happen in the absence of all traction), then the belly of the foetus must, by an extensive movement, be swung upon the mother's abdomen, and the head will be delivered at the posterior commissure of the vulva by the passage of the occiput, bregma, forehead, and lastly chin. The head thus successively presents within the vulvar ellipse the trachelo-occipital, trachelo-bregmatic, and trachelo-frontal.

Finally, the head may not rotate so as to come under the symphysis pubis, in anterior positions and when the trunk has been delivered. The child's life now demands interference (*vide* "Version").

### § 7. LATERAL PLANES ; SPONTANEOUS EVOLUTION AND SPONTANEOUS VERSION.

—It would seem, *a priori*, that natural labor was impossible when, at the superior strait, one of the two foetal extremities did not present ; therefore, in shoulder presentations, version is recommended. Before the time of A. Paré and his student Guillemeau, cephalic version was in vogue ; since that time podalic version is preferred. Hence the mechanism of natural labor in lateral plane presentations does not call for description. But there is a mode of engagement known as *spontaneous evolution*, which is none other than natural parturition in trunk presentations and, as such, this is the place for its description.

Science owes a debt to Professor Pajot for his special study of the mechanism of labor in spontaneous evolution ; he has succeeded in ascribing to the five stages of mechanism (already described for other presentations) the different movements which the foetus executes within the pelvis. Thus, the *first stage* corresponds to moulding, during which the foetus is so folded that the uppermost hip nears the uppermost shoulder, while the part opposite to the inferior lateral plane becomes convex, below, toward the superior strait, and the finger can then make out the shoulder by vaginal touch.

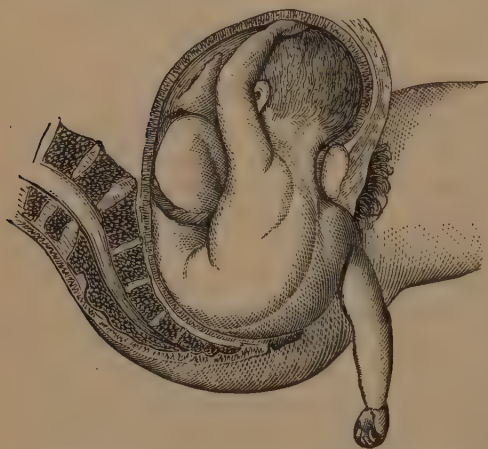


FIG. 57.—Spontaneous Evolution. Third stage of labor.

The *second stage*, or stage of engagement, is never complete ; for the volume of the trunk embarrasses and prevents descent and progress of the foetus.

In the *third stage*—internal rotation—the foetus turns so that the head comes behind the symphysis pubis. The pelvic extremity passes in front of the superior portion of the trunk to occupy the position the head has just left. The shoulder upon the floor of the pelvis

turns and comes underneath the symphysis ; the arm becomes extended and hangs into the vagina, while the neck of the foetus is just back of the vertical portion of the symphysis pubis.

*Fourth stage ; engagement.*—This is the dangerous time for the child ; the loins, hips, buttocks and legs pass in succession in front of the chest of the foetus within the pelvis, and then engagement occurs.

*Fifth and sixth stages.*—Internal rotation of the head, which as in breech, brings the long diameter of the second foetal part into the coccy-pubic diameter of the maternal pelvis, is followed by its delivery and terminates the case.

Such is the mechanism of natural labor in trunk presentations. There are few varieties or abnormalities ; but it is very dangerous for the mother, and still more so for the child, which is nearly always born dead. Hence the physician should not count upon this mode of termination—which is very rare—but should always perform version.

This is not the only mode of delivery which nature brings about in transverse presentations. *Spontaneous version* may occur, but is infinite-

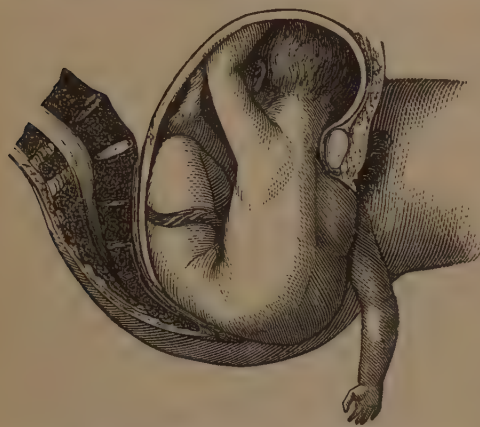


FIG. 58.—Spontaneous Evolution. More advanced than in Fig. 57. Beginning of the fourth stage.

ly more rare than evolution. While over 150 cases of evolution are recorded, only a very few cases of spontaneous version are known (*quelques-unes*, etc.). Velpeau has made special studies of this phenomenon, which Deuman mistook for spontaneous evolution.

The learned professor of "La Charité" ascribed to irregular uterine contractions acting upon one side of the womb, while the other was inert, the displacement

of that shoulder which occupied the superior strait. Then this shoulder rose up on the side of the womb where no resistance offered, and the head gradually replaced, in the superior strait, the shoulder that was moving away from that site.

We can readily see that the breech can replace the shoulder by a similar mechanism ; hence two varieties of spontaneous version are made : cephalic and podalic.

This form of delivery is very favorable to the child. We met with an illustrative case of spontaneous version.

Finally, if the foetus is immature, if the pelvis is deformed (larger than normal), or if the foetus is dead or decomposed, when the presentation is transverse the child may not perform any of the motions described, but can be delivered *doubled up*. This is a third method of spontaneous delivery in trunk presentations.

## CHAPTER III.

### MANAGEMENT OF MOTHER AND CHILD.

#### ARTICLE I.—MANAGEMENT OF MOTHER AT END OF PREGNANCY, AND DURING LABOR.

MANY physicians order baths toward the end of pregnancy. These do not make labor easier, but they have a favorable effect. They are to be given before going to bed, and no more than one a week should be taken.

Bleeding is reprehensible. To-day we know that pregnancy predisposes women to impoverishment of the blood, and this is reason enough to forbid bleeding except when absolutely necessary.

Proper hygiene and moderate exercise are more favorable to the occurrence of normal labor.

Too much exercise may induce premature delivery, yet it does not necessarily bring about an easy labor. Excessive emotion, horse-back riding, and excessive coitus should be avoided.

I have often been asked whether cold baths are harmful to the pregnant woman. In those who are accustomed to them, I think they are followed by no bad results. I have given my views on this subject in *La Gazette Obstétricale*, No. 22, 1873. Joulin holds the same views.

Clothing should be sufficient in amount and not tight fitting, hence corsets are forbidden; and constipation should be avoided by frequent injections. Such is the advice to be given to a woman whom we are to deliver. In cases in which a physician is called in for the first time to a woman who says that she is at the end of term, he should first find out:—

1. Whether or not the woman is pregnant.
2. Whether or not she is at full term.
3. Whether or not she is in labor.

The first is answered by the woman herself, and by external and internal examination. Exploration of the internal organs is to be made last of all. (See chapter on Symptoms of Pregnancy.) The condition of the cervix and the height of the uterus answer the second question. If the woman is in labor she has intermittent contractions with pain; the cervix commences to dilate and the bag of waters appears. The latter points prevent us from confounding false with true pains.



When the last question is answered we should immediately make out the presentation of the foetus. This is very important and usually very easy. The position may at first be completely ignored; the pelvis should be examined during our first exploration by means of touch, and at the same time we should not neglect inspection of the lower extremities. Never fix an exact time for the duration of labor, for mistakes are too easily made upon this point; yet we ought to keep in mind that the woman is or is not a multipara. When the orifice is dilated so as to measure 22 to 23 mm. (very nearly 1 inch, the size of our silver quarter) before rupture of the membranes, the physician must have at hand everything necessary, and should arrange the bed, have the woman urinate, and have her receive an injection. Her hair should be braided before labor begins. There should be nothing causing abdominal compression; belts, garters, etc., should be removed; and the woman, wearing a loose night-dress, should walk around during the intervals between the pains.

Meanwhile, if she wishes she may drink sugared water flavored with orange, and if labor progresses slowly she may be permitted to drink sparingly of bouillon and soup. No one should be in the room whose presence is not necessary.

*What to have with You.*—Joulin, in his treatise, gives a detailed account of what should constitute an obstetrician's case (page 622). On a table within easy reach of the physician, there should be (1) ergot, best in grains so that it may be pulverized directly before use; (2) extract of belladonna; (3) a bottle of laudanum; (4) a bottle of chloroform; (5) forceps (Pajot's split forceps are best for a case of instruments); (6) a stethoscope; (7) gum catheter with its stylet; (8) laryngeal tube; (9) lancets.

For the country practitioner all these objects are absolutely necessary; and in the city an obstetrical bag with all these in will be very serviceable. Besides these we should have waxed thread and scissors, for there may be sutures to make. A quill pen well sharpened, cold water, vinegar, and grease (butter, lard, or vaseline), are toilet articles for the new-born.

We must have a fire, so as to have hot water if necessary.

Finally, there must be a large bowl to bathe the child in.

Near an easily opened window place a table, a pillow, a folded sheet, a compress with a hole in it, and a body-bandage for the umbilical cord. When the child is born carry it to the table and wrap it in a warm cloth. The baby-linen must always be attended to by the physician, unless there is a nurse.

*The Arrangement of the Bed.*—The labor bed ("misery bed"), or "little French bed," is that on which the parturient woman lies. This is an old custom, mention of it being made by Prudence, an author of the fourth century.

In the middle ages women were placed in a chair *ad hoc*.

In France we have a folding bed, which must be so arranged, for the

convenience of the obstetrician, that the head corresponds to the usual foot of the bed, and so that the physician can pass around it easily. A big book or a flat piece of board is to be placed underneath the mattress, under the woman's buttocks. Some fold up a second mattress and place it under the first, on a level with the mother's pelvis. Again, some put a board across the end of the bed so that the woman may "get a grip;" this, we think, is a dangerous proceeding.

At the "Accouchement Clinic" in Paris, P. Dubois has introduced the use of plane, hard beds, covered with oil-cloth, large enough for the woman to stretch out at full length, and rest on her side in the interval between the pains. These model beds also serve, after delivery, as stretchers, to carry the woman back to the bed which is to be permanently occupied. To-day, when all the beds are furnished with an elastic mattress, it is better to deliver the woman on the bed she is to occupy, having previously covered it with a couple of folded sheets and a piece of oil-cloth. The upper sheet and the oil-cloth are to be taken away after delivery. In this way we avoid moving the woman after childbirth.

*To Support the Perineum.*—While the obstetrician is busied about the bed and room labor is going on, and pains becoming more and more frequent indicate the commencement of the active stage. When the orifice is dilated the woman should be put to bed, and the physician seats himself on the right of the bed, facing the patient, whose lower limbs are to be slightly flexed. The membranes, now lacking support, rupture spontaneously.

Sometimes the physician has to rupture them with his nail or with the sharpened point of a quill pen. The least evil result of intact membranes is retardation of labor. The child is then born with a caul, an event not creditable to the physician, in spite of the favorable prognosis that old women gossips deduce therefrom.

When the cervix is dilated, touch and auscultation should reveal the position of the fœtus. When true expulsive pains begin we must see whether the perineum bulges, and if it does we must support it during contraction, running the hand underneath the woman's right thigh, extending the thumb along the right labium majora, the four fingers forming an inclined plane under the perineum, a plane running upward and forward, *i.e.*, from the ulnar to the radial side. The hand must not be held stiffly.

Some otherwise competent obstetricians think that there is no need of supporting the perineum during the stage of expulsion; but we hold to the old custom, which certainly will prevent reproach if accidents should happen. Besides, as Pajot rightly says in his Lectures, if some women are delivered without attendance and without rupture of the perineum, there are others who always rupture the perineum, even when aided by capable physicians.

It cannot be denied that some women would have ruptured their perineum had it not been supported. There are some perineums so delicate that they will rupture to the anus unless carefully supported.

A perineum whose skin is elastic and soft will, on the other hand, not rupture, but will dilate. Those of old primiparæ are not in this category, however, for the skin is thick and inelastic and almost necessarily ruptures beneath the supporting hand.

We may take a middle course: without directly supporting the perineum (which is far from preventing rupture in every case) we may oppose a hasty exit of the head either with the thumb of the right hand passed under the mother's right thigh, or with two or three fingers of the left hand passed over the pubis of the patient, as Joulin advises.



FIG. 59.—Distention of Perineum and Dilation of Vulva.

[We should prefer the term “management” to that of “support” of the perineum, and would be guided by somewhat different thoughts than those of the author. When the perineum begins to be distended, introduce two fingers well into the rectum, the tips of these will then succeed in maintaining good flexion of the head while that portion of the fingers which join them to the hand will draw forward the posterior part of the perineum to the support of the thin, anterior edge, giving it greater resisting power. *Carefully avoid* direct pressure upon the perineum, for such pressure acting in a reflex way stimulates all the parturient forces and increases the danger of violent pains. Allowing the thumb of the same hand to rest on the advancing vertex, too rapid descent may be prevented. Be careful also to disengage—with the fingers of the other hand—the occiput from the pubic arch and anterior vulval commissure, so that that portion of the head shall be wholly delivered, before allowing descent and extension of the face, giving us, as diameters which will distend the perineum, the *sub-occipito-bregmatic*, *sub-occipito-frontal*, and *sub-occipito-*



mental, instead of the occipito-bregmatic, occipito-frontal, and occipito-mental. This sort of "*management*" will most materially prevent frequent perineal lacerations.—Ed.]

The fissures about the margin of the fourchette must always be watched and the blood which may cover them is to be wiped off.

When the head is out it must be supported, not grasped, to prevent the blood and fluids from the vagina entering the child's nose or mouth. The index finger should be carried about the child's neck to find out whether there be loops of the cord encircling it. In such an event, cut it immediately, unless we can displace the loop.

When the head has rotated externally, *watch the perineum still, for the shoulders are to be delivered*, and we must not pull on the trunk for fear the uterus, too quickly emptied, will not have time enough to contract in a normal manner to so small a size, and therefore hemorrhage be induced.

In *breech* cases we must watch the umbilical cord to see that it be not pulled or compressed. Above all let nature act here, lest the head straighten up. When the head remains alone in the pelvis, urge the woman to bear down, and then aid flexion by lifting the fœtus up toward the pubis when the occiput is in front; or lowering it toward the anus if the occiput is behind.

#### ART. II.—MANAGEMENT OF THE CHILD.

As the child comes into the world it utters a cry. When it does not it is apparently dead, dead, incomplete, or a monster. Each of these demands separate study.

A. THE FŒTUS IS HEALTHY.—The first thing is to cut the cord. The first ligature is to be placed 6 ctm. ( $2\frac{3}{4}$  in.) from the umbilicus, so that there may be enough space left for a second cut if this be necessary. The second ligature, the "*surety*" (the "*safeguard*"), should be a little farther away; we cut between the two. The second ligature has advantages and disadvantages; among the former are absence of hemorrhage in twin pregnancy—a hemorrhage that would be fatal to the second child—the cleanliness of the bed which is not soiled by the blood, and the greater ease with which the placenta may be detached, swollen as it now is by retention of blood in the placental vessels. Among the disadvantages is this very size of the placenta, which may not be able to pass the cervix, which may often quickly contract. Indeed this ligature *may* be dispensed with, but if we have the time it should be applied.

The first ligature is an absolute necessity, and those who omit it do a grave wrong; though in the majority of cases no evil results follow, since the final foetal circulation is usually established directly after birth. But it would be an obstruction to respiration were hemorrhage to occur, and would so compromise the life of the child. Examples from animal life will



not be proofs here, for animals chew and tear the cord; they do not cut it, and hence hemorrhage is not to be feared.

A mooted question is whether to tie and cut—or cut and tie as Professor Pajot advises.

The condition of the child (*vide infra*) must answer this question.

*B. THE CHILD IS TO ALL APPEARANCE DEAD.*—A child who does not cry may have two distinct aspects: it may be pale as if anæmic and feeble, or it may be blue, with a congested, turgid face. Both are due to asphyxia, but to asphyxia induced by two very different mechanisms. In the first, the less common case, there is rapid asphyxia from sudden compression of the cord. Here tie before you cut, and revive the child by every possible device, especially by artificially supplying air to the lungs. In the second case asphyxia is slowly produced, and a condition results resembling “apoplexy.” Here cut before ligating and let one or two spoonfuls escape. Upon such simple treatment the child will assume a normal appearance and will cry without the need of insufflation, in the majority of cases. These suggestions can be illustrated every day, and experience is the best answer to those who believe the slight bleeding harmful to the child in cases of apoplexy.

We may also cut before tying when the condition of the child is normal, but on condition that we immediately tie to prevent useless loss of blood. We prefer to ligate first, except when necessity compels us to do otherwise.

In 1875, Dr. P. Budin, at the suggestion of his preceptor, Professor Tarnier, endeavored to determine at what moment it was best to cut and tie the cord. His results, from 75 cases, led him to state that “to tie and cut the cord directly following delivery, is to prevent the foetus from drawing 92 grms. (about 3 oz. avoirdupois) of blood from the placenta, which is equivalent to bleeding an adult to the extent of 1,700 grms.” (60 oz. avoirdupois).

Admitting this as proven—although this is *not* as yet accepted by the majority of obstetricians—we conclude *that we must not ligate and cut until one or two minutes after the cord ceases pulsating*, or, as Dr. Kohly says, at the moment *when the umbilical vein is completely emptied of blood*.

Hélot (of Rouen) and Schüking, leaving the cord intact, neither cut nor tied, but still attached to its (intra-uterine) placenta, weighed the newborn children first, directly they were delivered, then, again, a few moments after the cord ceased pulsating, and they proved that at the second weighing the child was (on the average) 53 grms. (Hélot) or 62 grms. (Schüking) heavier ( $1\frac{1}{2}$  oz. or  $2\frac{1}{2}$  oz. avoirdupois).

For myself I yield to these important statistics, and shall adhere to the “new way,” but on this condition, that I shall ligate, with Hélot, when respiration begins, or as Porak still better advises, when the pulsation in the umbilical arteries ceases. I think this is the indication of the true physiological limit.

This practice is, moreover, one that does not expose mother and child to a chill. Of course the second ligature is here useless.

*C. THE CHILD IS DEAD.*—In such a case there is nothing to do. The obstetrician should have foreseen the event to guard his reputation.

A foetus may die during gestation or during labor.

*Symptoms of the Death of the Child.*—As signs of death of the foetus during pregnancy we may name :

1. The habitual illness of the mother, especially if diseases or convulsions have occurred, or she has received a blow during gestation.

2. Sinking of abdomen and diminution in size of breasts after the latter have contained some milk.

3. Certain signs are cessation of foetal movements and foetal heart-sounds where they have both been clearly made out previously.

4. The sensation of an inert body within the abdomen obeying the law of gravity when the woman lies on her side.

5. During labor the absence of a sero-sanguineous presenting part, fetor and brownish-black color of the amniotic fluid, cessation of heart-beats and foetal movements, and a large quantity of meconium in vertex presentations. If the cord can be reached, its shrivelling, brown color, and absence of pulsation will be symptoms of death of the foetus. In face presentations the softness of the lips, the flaccidity and immobility of the tongue may lead us to suspect death. In breech, the non-resistance of the sphincter ani is the characteristic sign. In this case the presence of meconium has no diagnostic importance, even as to illness of the child.

*D. THE FŒTUS IS INCOMPLETE OR A MONSTER.*—This subject belongs to the domain of *teratology*. An incomplete foetus results from arrested development. I exhibited a disembowelled foetus having but one lower extremity to the Academy of Medicine, September 12, 1882. Previous to this I had also presented the same society with teratological cases ; but they are of rare occurrence.

Let us again recur to the management of a healthy child.

The cord has been cut after its ligation. The child is wrapped in warm cloths and carried to the table prepared therefor, or laid on the nurse's lap. Then with some greasy material rub off the sebaceous matter, especially that in the inguinal folds on the neck and on the back. Then plunge the child into a lukewarm bath, holding it with the fingers under the arms. Then sponge and dry it with a warm linen cloth. After having noticed whether there is any deformity, wrap up the cord. The fenestrated compress is greased on one side, passed over the stump, and the compress is closed by being wrapped over the cord, and the whole carried over upon the left side of the child. A simple body-bandage is placed over it. The child may now be dressed, this duty falling to the nurse. We must acknowledge that, in this, we are excelled by midwives and nurses. It is beneath the dignity of the physician, and it is well for

him to know just what is proper to do and not to do. Lack of such knowledge often influences the future of a beginner, who, first practising in poor families, is obliged to do everything.

In the baby's *trousseau* the various articles may be duplicated once or twice; they are nearly always made during pregnancy, and they must be near the obstetrician during labor.

While the woman is in pain and before dilatation is complete, put three caps called "*biggins*" one within the other: a linen cap, a flannel cap, and a cap of quilted cotton, to which are fixed the ribbons that tie them all on. Some put the flannel next the skin, others, especially in warm weather, only use two caps.

*The Waists.*—These are two or three little jackets sewed together beforehand, the linen being next the skin; the opening of the waist is on the back of the foetus, and it is provided with hooks and eyes, strings (like corset-strings), or is to be pinned up.

These are to be put on with care, especially when it comes to slipping the arms in the sleeves, the most delicate and difficult part of the operation.

Finally, the child's napkins and swaddling-clothes complete the *toilette*. The napkin is put on so as to keep the meconium and urine from touching the legs. The swaddling-clothes are to have their sides carried back over the lower limbs, and the overlapping flaps are strongly pinned.

In England the *toilette* is less extensive. There is only a square napkin, whose four corners are brought together like the mouth of a bag over the pelvis. A flannel cloth covers this, and the child is dressed. But a reaction is taking place, and they begin to clothe the new-born as we do here in France.

[It does not seem as if the customary manner of dressing the newly born child in this country calls for description.—Ed.]

### ART. III.—MANAGEMENT OF TWIN DELIVERY.

In twin pregnancy the second child is usually born with the greatest ease. Still a variable, often a long, interval of time may elapse between the births. The womb having been extraordinarily distended contracts less energetically and less frequently. And this feebleness of contraction may even be noted before the first child is born, inducing tedious labor.

When the uterus remains very large after the birth of the first foetus, the cause of this must be looked to, if we have not previously diagnosed twin pregnancy. Placing the hand on the abdomen, it is easy to discover the height of the womb and to feel several "foetal inequalities." Auscultation will confirm our diagnosis, and will tell us whether or not the foetus is alive, and whether it is healthy or feeble.

Then it is that the second ligature, placed nearest the placenta, renders

such important services in case vascular communication exists between the two placentæ [rare]. If this precaution has not been taken, observe it immediately after discovery of the second child. Touch enables us to recognize, at the upper part of the cervix, a *second* amniotic pouch, or a second presenting fetal part.

When contractions are renewed (in five to twenty minutes ordinarily) we only have to rupture the membranes, if they are still intact, and trust delivery to nature.

Science records several cases in which the pains of labor have not returned until several hours—even several days—after the birth of the first child (*Gentleman's Magazine*, 1814).

The obstetrician should, in cases of tardy expulsion of the second child, endeavor to arouse contractions by rubbing the abdomen, irritating the os externum, rupturing the membranes, and, if necessary, by giving a dose of ergot. It should not be forgotten that labor will be comparatively easy when the parts have been so recently dilated, and also that violence may be followed by *inertia uteri*. Finally, a twin delivery may be regarded as two ordinary labors in succession (Tarnier).



## CHAPTER IV.

### DELIVERY OF APPENDAGES.

THIS is the natural or artificial exit of the foetal appendages from the maternal organs.

The normal displacement of the placenta occurs from uterine contractions that are renewed after expulsion of the foetus, and which twist the peripheral vessels and adhesions in toward the centre. As involution goes on, the surface of the womb grows smaller and smaller, the friable

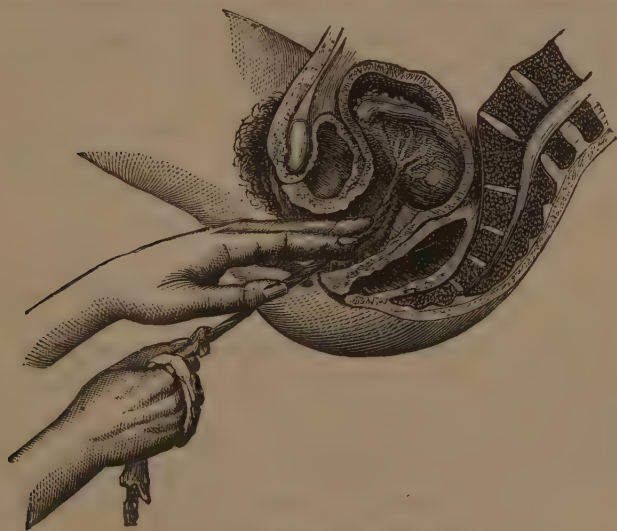


FIG. 60.—Extraction of the Placenta.

attachments and vessels that bound placenta and uterus together rupture (especially at the circumference of the former organ), and the placental mass falls over the cervix.

A gush of dark-colored blood, of varying quantity, accompanies detachment of the placenta. Physiological contraction of the uterus diminishes the lumen of the vessels and the hemorrhage quickly ceases.

Caillant was the first to describe the "sound of the placental detachment," a series of fine cracklings quite audible with the stethoscope.

Gradually the placenta is moulded within the cervical canal, and after a few minutes to half an hour or more, it escapes, the foetal surface for-

ward. Having entered in the vagina, the expulsion of the placenta is favored by bodily movements, action of the abdominal muscles, and also by a certain contractile power of the vagina, denied by Joulin, but which apparently arises from augmentation of the muscular layer, occurring during gestation. (Rouget.)

[When the placenta is *spontaneously* detached and expelled, it usually comes out edgewise, somewhat rolled upon itself.—ED.]

It may happen that after detachment of the placenta it may be retained in the womb by constriction of the orifice. As internal hemorrhage may arise from this, interference is advisable.

To this end find out, no matter how long since she was delivered, whether the woman has had contractions, and whether the womb has diminished in size. In the latter case the hand placed on the abdomen feels a hard ball, usually in the right hypogastrium, beneath the umbilicus. Touch discovers the placenta over the os uteri.

Taking the cord in the right hand (wrapping it in a compress to prevent slipping), slight traction is made, as low down as possible, *i.e.*, in the direction of the axis of the vagina. If necessary, two or three fingers of the left hand may be inserted into the vagina and form a sort of pulley over which plays the cord.

Sometimes the placenta resists even when there are no attachments. Draw the cord forcibly into a line with the axes with the right hand, place the left firmly over the fundus uteri and keep it there, then make traction. Rarely will this fail unless (Pajot) abnormal adhesions exist. When the afterbirth reaches the vulva, grasp it and twist it upon itself two or three times to liberate the membranes which follow its delivery. The gush of blood following the exit of the placenta ceases immediately. Then wipe the perineum and put a white cloth underneath the buttocks, so that any hemorrhage may be discovered, after having taken the precaution to remove all the clots from the vagina.

Since Chantreuil's time, we in France have been imitating foreign obstetricians in extracting the placenta by "*compressio uteri*." This method (brought into favor in Germany by Crede, and lauded in our own country by Chantreuil) we would not advocate except when the cord has ruptured, or is very delicate and friable, or, again, when we suspect an abnormal insertion.

The placenta must be examined to see whether it be entire, and whether the membranes are complete or not. Remnants of these within the womb are dangerous and may cause uterine colic. After twin birth, we wait a little longer than usual for the womb (which has been so distended) to diminish in size. Then gentle traction is made on the cord of the first child, which is always the least resistant, and the two placental masses quite easily pass the cervix uteri.

Finally, do not let the woman be disturbed or excited, do not tell the sex of the child, etc., etc.

## CHAPTER V.

### MANAGEMENT OF MOTHER DIRECTLY FOLLOWING DELIVERY.

AFTER delivery of the placenta have the woman's genitals sponged with lukewarm water, and make her change her linen. The clean clothes must be warmed and put on over her head, while the soiled garments are drawn off by an assistant over the feet.

If the woman has been delivered on a "labor-bed," carry her *yourself*, as soon as possible, to her regular bed, already prepared with a folded sheet and a body bandage, which is to be tied moderately tight over the abdomen, to keep the uterus contracted and to prevent syncope induced by a too rapid afflux of blood into the vessels of the abdominal cavity.

The beds having been arranged as above described, and close together, lift the woman up (the left arm being under her body, the right under her knees, while she clasps her hands about your neck), and put her gently down in her regular bed.

The physician is often so tired that he cannot do this ; and sometimes the woman is very fat and heavy. Whenever there is likelihood of a fall, this carrying will be dangerous ; all of which goes to show that the "labor bed" should be discarded. When the woman is finally at rest, have a warmed napkin placed at the vulva, changing this several times a day.

In some countries the mother is given hot wine and other excitants to "give her strength." This is to be avoided, since it provokes hemorrhage. A mild infusion of linden-tree, neither too hot nor too cold, will suffice for a drink ; and during the first and second days only give bouillon and soups.

Before leaving tell the nurse, who should be procured by the obstetrician himself, to be careful about ventilation, to take away the soiled clothes and anything that smells, and to watch during the first sleep for hemorrhage, and upon its occurrence she must take away the pillow, open the windows, and send for the physician. The latter is to be sure that good uterine contraction is continuing, by means of palpation, and is to notice the diminution in pulse-rate that nearly always follows delivery.

## CHAPTER VI.

### THE PHYSIOLOGICAL PUERPERAL STATE.

THE puerperal state embraces the time between delivery of the placenta and the return of the menses—about six weeks. This, Pajot's definition, seems the best, because during this time the woman is extremely sensitive to all morbid influences ; as illustrative we meet the special diseases, called puerperal, that are so liable to occur at this period.

Some wish to include the whole period of pregnancy. Pajot (*Gaz. des Hôp.*, April 15, 1862) has shown how rare puerperal diseases are in the pregnant woman, even in the midst of an infective focus or district. Non-pregnant *menstruating* women exposed to the contagion are more liable than pregnant women to these maladies. Indeed, menstruation has been compared to a little abortion.

Others, again, prolong the puerperal state till the close of lactation ; therefore I think we may speak of three states (*vide* p. 9 of my "Thèse de Concours," Paris, 1869):

1. Pregnancy.
2. Labor.
3. The true puerperal state.

As to lactation, it is a special condition that we shall study at the close of this manual.

Four phenomena occur in the puerperal state : (1) the lochia ; (2) the after-pains ; (3) the fever ; and (4) the absorption of hypertrophied uterine tissue or uterine involution.

#### ARTICLE I.—LOCHIA.

The lochial discharges consist of the material escaping from the vulva from the moment the placenta is delivered until the womb returns to its normal state, about three weeks.

Their odor is characteristic. When the placenta is born a gush of blood accompanies it, but this soon ceases. Then from time to time a little pure blood flows, without pain, and with but little force in some, while in others the flow is painful.

The pulse is good, and oftentimes very slow ; more or less intense fits



of shivering occur, and the teeth may chatter. This shivering is transient, it is "reactive," not from cold. The pulse may be slow for twenty-four to forty-eight hours.

Then the vaginal discharge of blood changes color; it flows out mingled with serum, and stains the linen. Blackish clots of varying size may escape in the lochia.

In 1860 Pajot read a paper in the *Académie*, wherein he proved that pus-cells were present in the blood which flows during the few moments immediately following delivery. Every six hours he found the number of leucocytes increased. All these elements are furnished chiefly by the placental site, which has been considered as a traumatic wound.

As the uterus contracts the vessels are narrowed, the fluid becomes less consistent, and by the fifth, sixth, or seventh day the bloody lochia disappear, to be replaced by a turbid yellow liquid. Lochia have been called bloody, serous, or purulent, according to their appearance. This is inexact; they are sero-mucous (Joulin), and muco-purulent (Pajot). The laity still believe that it is milk flowing by this channel.

Toward the third or fourth week the lochia gradually diminish; and from the sixth week to the second month, sometimes later, the menses reappear. This is the return of "child-bed."

If the woman nurses, menstruation does not appear, as a rule, till weaning. The lochia diminish as milk forms, and also should grave inflammatory symptoms occur.

The fetor and dirty brownish color which the lochia sometimes have, are bad signs, and indicate lack of cleanliness, ventilation, and antiseptic injections. The serous or purulent lochia may become bloody from some imprudence of getting up too quickly. Rest and a little ergot are indicated in such cases.

Besides the usual microscopic characteristics of the lochia we find in the early days bacteria and mono-cellular microbes; and (Dolérís) if they become purulent we almost always discover micrococci arranged in pairs. If the woman's temperature be high the micrococci are found arranged in the form of a rosary, which, according to Pasteur, is the special form for puerperal fever.

All these microbes are killed by anti-parasitic solutions in general, and especially by washes and injections of dilute carbolic acid.

## ART. II.—AFTER-PAINS.

These are the intermittent pains experienced by the woman after delivery. Primiparae seldom suffer from them, whereas they are the more severe the greater the number of children the woman has borne.

After-pains are only secondary contractions of the uterus, which seeks to return to its original size, and the vascularity of the walls of which is

diminishing. They begin a few hours after the placenta is born, and continue two or three days, longer if clots or pieces of membrane remain in the womb. They may be so intense as to become pathological; they are then to be treated by cataplasms and by large opiate injections. They are increased by the child sucking, but moderate pressure over the abdomen ameliorates them. The latter phenomenon would not occur were the pains inflammatory, for then pressure increases pain, the pulse-rate increases even when the woman is out of pain, and the condition is ushered in by a chill. It must not be forgotten that the visit of the physician often excites the patient and causes increase in the pulse-rate; but the fixity of the pain and its permanence will, with what we have already said, prevent error. A second examination of the pulse a few minutes after the first will give the true data.

After-pains are not necessarily due to clots in the womb; but when clots are present after-pains are never absent.

### ART. III.—FEVER IN THE RECENTLY DELIVERED WOMAN.

From the third to the fourth, or even fifth day, the woman experiences a slight rigor followed by an ephemeral fever, attributed until to-day to the fluxion occurring in the mammary glands, whence the name *milk fever*. A large number of eminent physicians have recently proved by clinical demonstration that this chill is analogous to the chill following an amputation. They compare the placental site to a traumatic surface; and Dr. J. Lucas-Championnière, the editor of the *Journal de Médecin et de Chir. Prat.*, also acknowledges in his "Thèse de Concours" (Paris, 1872) that the fever arising from traumatism without visible injury, without any skin lesion, is also as much traumatic in its nature as that indicative of a lesion in contact with the external world. The number of cases where secretion of milk is not accompanied by any febrile movement is known by all to be very large; but excessive swelling of the breasts, especially in country women, with local pain and a sense of tension in the arms, gives rise to a genuine milk fever. More rarely do we find it in city women, in whom mammary fissures or abscesses may also induce fever, which is superadded to the first-named. We find this oftenest in nervous women.

The fever of recently delivered women, in which the intensity varies with the individual, is accompanied by headache. The tongue is soft, large, and has a light fur on it. The breasts are swollen, hard, and extended into the axillæ. The skin is moist, but not so much so as formerly when diaphoresis was induced. The temperature rarely rises above  $39\frac{1}{2}^{\circ}$  Cent. ( $103\frac{1}{10}^{\circ}$  Fahr.). Only in exceptional cases does it reach  $40\frac{1}{2}^{\circ}$  Cent. ( $104\frac{3}{8}^{\circ}$  Fahr.). (Quinquane.) The lochia diminish but do not stop entirely, just as in puerperal fever, where there is always a little fever from the genitals.

The pulse should never rise above 90 to 100 per minute. Pajot long since called the attention of young physicians to cases where the rate exceeded 100 per minute. "Then be on the lookout," says he; "examine the iliac fossæ, the sides of the womb, the external genitals, and the vagina, to see if there be rents, abrasions, etc., etc. If you find nothing, look to the head, the thorax, or the joints, to see if you can find a cause. If now nothing is discovered, you may well be fearful; especially if, with the rapid pulse, the face changes and speech is embarrassed. Then we have a serious case. Here are the characteristics of true puerperal fever, not of metro-peritonitis, which always comes on with distention of the abdomen, vomiting," etc., etc.

The fever lasts twelve to twenty-four hours, and during this time the woman must not be excited, visited, or have too much fresh air. The diet is to be very bland and moderate. After the fever passes the breasts soften and diminish in size. Yellowish milk at first flows, and this is soon replaced by the white, creamy fluid adapted to the nutrition of the infant.

There are women in whom milk does not appear until the fifth or sixth day, especially if there have been puerperal diseases which have retarded its appearance. As soon as milk does appear it is a sign of improvement for the mother. In women who suckle the fever is milder and shorter. Sometimes, in primiparæ whose milk forms at once, there is at no time the slightest indication of febrile movement. Pathological phenomena may cause it to resemble traumatic fever.

Women who suffer from piles during pregnancy suffer violent pain after delivery from the pulling and twisting the tumors suffer during parturition. They may even inflame and cause pyrexia. In such case Joulín advises us to put a little ice in an india-rubber bag and apply it over the hemorrhoid. Renew the ice as it melts. In one to two hours the pain is bearable. The treatment may be continued half a day and begun again on the morrow. But then we must cover the tumor with a piece of fine linen so as to avoid so direct a contact. When we are about to stop, leave the little bag on till the ice melts and the water reaches the temperature of the bed, otherwise a reaction may bring back the pain.

Again, anal fissures may appear after delivery, usually due to compression and rapid distention of the soft parts.

Recently Stoltz (of Nancy) and Mattéi (of Paris) have studied this subject. Whatever be their mode of production, Mattéi recognizes how difficult is their spontaneous cure. (*Gaz. Obstet.*, July 5, 1873.)

In Dr. J. Masson's (of Charmes, Vosges) excellent thesis on fissures of the anus (Paris, 1868) we find the treatment varying according as the physician—neglecting the fissure—considers the spasmodic constriction of the sphincter paramount, or whether, on the other hand, regarding constriction as a mere result, he first endeavors to remove the ulceration.

Masson thinks—and we wholly agree—that the latter plan is the only

rational one; and it is especially adapted for recent fissures, those of traumatic origin, and hence those which follow delivery in women.

In the latter case therapeutic measures are very efficacious, and topical applications often suffice for a cure. The patient must be treated, for the fissure develops cicatricial tissue and ultimately demands surgical means for its cure.

#### ART. IV.—ABSORPTION OF HYPERTROPHIED UTERINE TISSUE, OR INVOLUTION.

This little-understood phenomenon is a retrogression of the womb to its primary size. It is due to the contractility and power of absorption of the new-formed muscular elements. Ch. Robin does not believe that the uterine muscular elements undergo fatty degeneration in order to return to the normal, as Retzius and Virchow state. But the ease with which the sound perforates the uterus after delivery seems a proof for the opposite view. (Dupuy.) It is the condition described by Professor R. Barnes, of London, as "*Sub-Involution of the Uterus*."

However this may be, the uterus steadily diminishes, more slowly in multiparæ than in primiparæ. Thus, at delivery it reaches the umbilicus; eight days later it is at the top of the pubes; in three weeks it lies within the pelvis. But it reaches its final (diminished) size only at the sixth week or third month. Robin found that the muscle-fibres were then shorter and thinner than during pregnancy.

The cervix also undergoes similar changes: it appears as if hanging within the fundus vaginae, and so soft are its walls that they are with difficulty distinguished from those of the vagina. As Pajot says, *à propos* of the novice who makes a digital examination just after delivery, "softness, softness everywhere." ("On ne trouve que du mou."—*Lec Orales*.)

Still, if by delicate touch we make out the limits of the cervical walls, we find they are thicker as we near the os internum.

As Tarnier states, these walls are thinnest in primiparæ.

Very often we find at the side of the cervix a rupture running to the insertion of the vagina, or even higher.

At times one is found on each side; or more rarely, on one of the lips of the os *tincae*.

If the raw surfaces cicatrize without uniting, permanent deformity of the cervix follows, often attended by metritis. (Tarnier.)

There is no obstetrician who has not seen with speculum, or felt by touch, such deformed cervixes.

After delivery the finger easily enters the cervical cavity, separating the lips of the external orifice, and reaches the os internum, which is already closing and offers some resistance to the finger's progress. But this is due more to the narrowness of the canal, which vertically is only 1 ctm. ( $\frac{2}{5}$  in.), than to the constricted os internum.



Recent investigations make the length of the cervix after delivery 8 ctm. ( $3\frac{1}{2}$  in.) for the first few days. Hecker, quoted by Tarnier, found, in forty-eight measurements, that it might be 9 ctm. long ( $3\frac{3}{8}$  in.) just after delivery.

Martin, who has also made extensive investigations, states that the cervix is always much longer a few days after parturition than the normal, for Braune's canal, developed by delivery, preserves nearly its entire length after the expulsion of the foetus, and this length may be 10 ctm. (3 in.). It soon diminishes in size.

The recent studies of Lott give a mean length to the cervix uteri after confinement of 7 ctm. ( $2\frac{3}{4}$  in.). Others state that it is between 5 and 7 ctm. (2 and  $2\frac{3}{4}$  in.).

It seems that the more painful and tedious the labor has been, the more that part of the womb between Bandl's ring and the *os tincæ* will be elongated. This lengthening is preferably along the anterior lip, which is swollen and œdematous when labor is prolonged beyond the usual time.

Having observed the form of, and the changes in, the cervix directly after delivery, it is not so easy to follow them when the lochia appear.

Lott has studied the shortening of the cervix subsequent to delivery, and on the twelfth day he finds it 3 ctm. long ( $1\frac{1}{2}$  in.).

During these twelve days diminution runs a parallel course in the body and cervix uteri. But thereafter the uterus continues its retrograde movement, and the cervix, having almost returned to normal, suffers only insignificant changes.

To confirm this we have only to make autopsies on those who have died during the period of uterine retrogression. But, with rare exceptions, women who thus die suffer from puerperal diseases, and hence the genitals whose retrogression has been retarded will always appear larger than normal.

With Autefage's pelvimeter the physician may daily measure (as he could with his hand measure a womb on the dissecting-table) the diminution in length of body and cervix uteri, and can obtain data that are useful in our knowledge of the prognosis, treatment, and hygiene of the puerperal female.

The cervix has its final form—always larger than normal—at the sixth week. The phenomenon of absorption is interrupted by any morbid complication. The womb is stationary, in fact, during the fever following parturition. But when health returns the uterus rapidly diminishes.

From the twenty-fifth to the thirtieth day—*i.e.*, before the menses reappear—the *os tincæ* is cylindrical, and larger in size than it will ultimately be.

The external orifice—in future the only accessible portion—is transverse and irregular; its borders are jagged, but touch still perceives its softness. The lips can easily be separated.

In ten to eleven weeks after childbirth Wieland believes the cervix to have become normal.

## CHAPTER VII.

### MANAGEMENT AND REGIMEN OF THE WOMAN DURING CHILDBED.

VISIT the woman five or six hours after parturition, and three or four times in the next two days. At least make *one* visit a day.

All precautions (Chapter V.) having been taken, ascertain :

1. If the woman has micturated.
2. How much blood she has lost.
3. Whether the abdomen is painful, how high the womb is, and whether there are after-pains, employing palpation.
4. The condition of the pulse.

Sometimes when the bladder is very full the woman does not desire to urinate.

This transient dysuria has been attributed to temporary paralysis of the neck of the bladder, or to mechanical results from pressure of the foetal head upon the mother's urethra. But Verneuil has found that in women who have been operated on, almost complete dysuria occurs within a few hours after the operation. Is there not in this another proof of the correctness of the comparison of a woman with milk fever to one suffering from traumatic fever?

If the fundus uteri is above the umbilicus, it will be because the urine retained in the bladder pushes up to that point. This may cause abdominal pain ; but the pulse will be normal. Make the woman urinate, keeping her in the horizontal position : therefore employ a bed-pan.

In a few days the patient may sit up to urinate ; this also aids the exit of the clots which may form in the vagina on account of small, secondary hemorrhages. If the woman cannot urinate, introduce a catheter.

CATHETERISM.—In a woman who has just been delivered the genitals are inflamed, painful, and so deformed that the meatus lies in the vagina. Sometimes it is not in the median line ; hence I believe in uncovering the woman and first washing the genitals with warm water. Separating the labia with the fingers causes the meatus to gape. A pan placed between the woman's legs receives the urine.

If the woman will not be uncovered, the physician stands at the left of the bed, inserts the left index-finger into the vagina, nail downward, and

carries it along the median line to the tubercle terminating the anterior column of the vagina. A large, soft, oiled catheter—held in the right hand—is slid along the index-finger, and is thus entered into the urethra, whose meatus is found on the summit of the tubercle.

If the bed is so placed that the physician is on the right of the patient, reverse the hands and proceed as above.

One should also have the woman's soiled napkins shown him. Usually a woman soils six the first day, the blood coming intermittently, colicky pains preceding its gush, especially in multiparæ. These "colics" are unimportant, the pulse being good and there being no pain during the intervals.

The woman must remain in bed for a fortnight; in the middle classes they get up on the ninth day, as a rule, without any ill-effects. During these nine days make at least one visit a day; watch her regimen; prevent constipation; and when the womb sinks behind the pubis she may be allowed to sit up in an arm-chair. This is usually the eighth or ninth day. The next day they walk about the room a little. They must not go out, however, until eight days after this period, and cannot sit at an open window before this time.

Among the poor, especially in the country, the women get up much sooner, and in a few days are at work about the house. This must be forbidden, above all in cities. It is the cause of the great frequency of uterine displacements. When women get up too soon the lochia become bloody. Then the woman must be put to bed again.

The diet on the first day consists of bouillon and soup; next day, if there is constipation, give an injection or a glass of Seidlitz water; the food is to be "white meat" and eggs. At the end of three or four days we may give a mutton chop and a little wine and water, but no coffee or other stimulant.

Meanwhile avoid annoying the woman, especially concerning the child; she is to be kept quiet and calm, and is not to have too many visitors. If it is a crying child keep it in another room. The mother should know nothing about the baptism if this ceremony occurs a few days following labor.

The bed is to be made the third day after delivery, and then is not to be touched until after the fever. When made the woman is to be carried to a folding bed and then carefully carried back, with all the precautions already given.

The day the woman first goes out of doors must be chosen according to the season. It is imprudent to have her go out for the first time for her "churaching." The woman must not go out morning or evening, and she must be warmly clothed, especially over the breasts and genitals.

Science records numerous examples of puerperal fever contracted from neglect of these precautions.

A. THE MOTHER NURSES HER CHILD—MANAGEMENT OF THE CHILD.—Apart from the diet we have just spoken of, it is usual to give women who have just given birth to a child an infusion of linden-blossom tea ("*tilleul*") and orange leaves. This tisane, useful on the first day, can be replaced by some other drink afterward, heated to the temperature of the body. To-day we do not induce sweating by heaping clothes on the woman, and hence we rarely observe miliarial eruptions that formerly were so common. At the third or fourth visit after we have examined the child and found it free from deformities, that it has urinated and passed the meconium, it is to be put to the mother's breast. This is not that the child may gain nourishment, for until the breasts fill with milk colostrum alone flows. This is a slightly purgative fluid, hence advantageous for ridding the gut of meconium. Putting the child early to the breast is beneficial in primiparæ, since sucking brings out the nipple and opens the galactophorous ducts.

The mother who nurses suffers very much for the first few days. Some advise putting the child to the breast as soon as it is born, but about twelve hours of rest should be accorded the mother. At first she must suckle her child, remaining herself in the horizontal position while the infant lies at her side. She must never go to sleep in that position, or fail to put the child in its crib after its meal. It is also best that the mother should not sit up to take her meals. The woman who suckles her child is less exposed to puerperal diseases and chronic uterine affections. (Verriet-Litardière, "*Thèse de Paris*," 1873.) During the first twelve hours, or until there shall be sufficient nourishment in the mother's milk, the child may be fed with sugar-gruel or milk-and-water.

If the child does not pass meconium the first or second day we need not worry, for colostrum will soon induce its passage.

We must also watch for the cord to drop off, which usually occurs on the fifth day. An inflammatory zone surrounds the base of the cord before it falls off. The greased compress is to be changed from time to time, and should suppuration or ulceration ensue, the cord is to be bathed in aromatic wine. We must let the cord drop off spontaneously; on the third day Wharton's gelatin and the amnion disappear, the vessels alone remaining. The cicatrix has sometimes been the starting-point of serious erysipelas, especially during an epidemic. (Clinique, 1858-59.)

After the cord falls off the spot is to be covered by a thick compress, and a body-bandage is to be kept over it for six weeks. Sometimes the child does not suck well from feebleness, from abnormal conformation of the nipple, or from abnormal extension forward of the frenum linguæ. The nurses call this tongue-tie.

In the first instance it may be necessary to have a multiparous nurse whose milk flows without effort. In the second case we may either bring out the nipple by cupping, put on an artificial nipple, or abandon all idea



of nursing. In the chapter on "Lactation" we shall mention all the conditions of a good nurse. Finally, if the child is so tongue-tied that he cannot suck, cause him to open his mouth by pinching the nose, and pushing back the tongue with a sound, cut the bridle ( $\frac{1}{4}$  to  $\frac{2}{8}$  in.) with a pair of scissors.

Let the mother regulate as far as possible the feeding of the child, especially at night. Neglect the interests of neither one nor the other.

If the nipple should crack or become eroded, first apply simple cerate, cacao-butter, etc., or use an artificial nipple, the softer and the more pliable the better for the child. "Charrière's softened ivory nipple" is the best. The raw nipple may be kept from contact with the saliva by collodion or gold-beaters' skin; but the *tip* of the nipple is to be uncovered. The surest plan is to stop suckling on that side. Should an abscess form, open it as soon as there is fluctuation, and allow no sucking from that breast for a time for fear of pus mingling with the milk. Weaning, dentition, etc., etc., are treated of in the chapter on "Lactation" (*q. v.*). In Part V. the use of anæsthetics in childbirth and the discussion of vaccination will be found. In this way our regular study shall not be interrupted by secondary considerations.

*B. THE CHILD HAS A WET-NURSE.*—Since in this case the nurse has a more nutritive milk than the mother, on account of having been previously delivered, the child who has had sugared water during the few days it was awaiting the nurse may not have passed any meconium. Then one or two teaspoonfuls of the compound syrup of chicory may be given, to act in the slightly purgative manner of maternal colostrum. Colic is indicated by the shrieks and contorted faces of the little one, and in some children is very common; this syrup is also beneficial here. The mother usually suffers from an intense fever in these cases, and a moderate saline purge may be given her at two or three days' intervals. This is the best means for drying up the milk; but, so as to be liable to no reproach, it is well to give the mother who does not suckle her child some "tea," usually made of periwinkle, dog-grass or reed-grass. One or two grammes of nitrate of potash may be added to a quart of the "tea."

When the breasts are engorged poultices, a bandage to support them, and repeated purgings are all that is required. Weiss' buttermilk is a gentle purgative and very useful in these cases. If an abscess form, open it. Women who oftenest have abscesses are those who have endeavored to suckle, but who have been forced to abandon it from some cause or other. The abscesses are often very deep and "button-like." Rarely do we find but one. They usually intercommunicate, and are to be opened as quickly as they form.



## Part 4.

### PATHOLOGY OF PREGNANCY: DYSTOCIA.

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THE pathology of pregnancy embraces anything that may interfere with its regular progress and course, as well as those accidents that render parturition or delivery difficult and dangerous for either mother or child (dystocia).

Exaggerations of sympathetic disorders enter this domain.

## CHAPTER I.

### DERANGEMENTS COMING FROM FUNCTIONAL CHANGES— HYGIENE AND THERAPEUTICS.

#### ARTICLE I.—MENSTRUATION.

WE have not as yet referred to persistence of the menses during pregnancy. The flow may partake of the nature of a hemorrhage and induce abortion, as we shall see later on. After the sixth month of pregnancy hemorrhages are usually caused by insertion of the placenta low down in the womb or over the cervix. (See Art. "Hemorrhages.")

#### ART. II.—DIGESTION.

§ 1. ANOREXIA.—Loss of appetite gradually disappears as pregnancy progresses. Still, a bitter tonic may be administered; but should there be any dyspepsia a mild purge is first demanded: castor-oil, magnesia, or rhubarb. Emetics must not be employed except when acute symptoms render them indispensable.

§ 2. GASTRALGIA; PERVERTED APPETITE.—Neuroses of the stomach demand the ordinary treatment: alkalies, absorbants, and Vichy water. Opium is to be given preferably by the endermic method; and injections are to be used to prevent constipation. These are the best means of treatment.

With odd or depraved cravings, *pica*, *malacia*, we must not forbid the articles unless they are harmful *per se* or because of the amount taken. Sometimes the desired article is digestible, but it is not prized unless *stolen*; a nice legal point. But if this petit larceny stops at gormandizing we may wink at it. Later on perverted appetite gives way to the normal.

§ 3. VOMITING.—From the very onset nearly all women suffer nausea, which in many is followed by vomiting. Dr. Guéniot has written an excellent thesis on uncontrollable vomiting. (Paris, 1863.) He divides vomiting into three forms. The first, following nausea, gives way to simple treatment, even spontaneously, as pregnancy goes on. It is a glairy vomit, occurs in the morning chiefly, and two or three times a day ("morning



sickness"). The second is a *bilious* vomit, occurring after meals, and in it are particles of undigested food. Every motion of the woman induces an attack. Guéniot calls this a dangerous vomit. Treatment may cut short the condition, but not so easily as the first-described. Carbonic acid and effervescing lemonades, smashed ice, ether, morphia (or an opiate blister over the epigastrium), Gubler's eupeptic elixir, pepsin, oxalate of cerium (Simpson), etc., may all be tried. When vomiting resists all rational treatment we have the third variety, *uncontrollable* vomiting. As the vomited material consists of the food, and as every movement or even a spoonful of broth or "tea" induces an attack, the poor woman soon becomes marasmic and anæmic, and will die unless appropriate treatment is at once given.

Nourishment and drugs may at first be administered in injections *per rectum*, and thus prolong life; but if we desire any chance of success we must interfere at the onset of this third period, for later the woman cannot stand treatment of any kind. Dubois even advises us to interfere during the second—*bilious*—period (*Union Médicale*, 1852, p. 162). The foetus is not worth the miserable state the mother is now in. Abortions and premature deliveries have often resulted from uncontrollable vomiting, which ceased as soon as the uterus emptied itself; and the obstetrical treatment of this dangerous attendant of pregnancy consists in inducing premature labor.

But since evacuation of the uterine contents does not always stop it, and since women have died from abortions, quite a number of physicians are against it. Others only allow it *after the seventh month*, so that a viable foetus can be delivered.

Vomiting begins with pregnancy, and when it becomes uncontrollable the mother's life is compromised before the time when the child is viable. The early vomiting often ceases, reappearing, however, at the eighth or ninth month, when it is the result of pressure. Rarely it begins only at the fourth or fifth month. Hence by inducing abortion before the third month we have great chances for saving the mother's life.

Of course it is understood that all other means have first been tried unsuccessfully; cauterization and leeches to the cervix (Obs. I., Guéniot's *thèse*), or removal of a small bit of the ovum, as P. Dubois practised with success in one case (Obs. XV., *loc. cit.*). Have a consultation with a number of experienced obstetricians about her—for once this assembly was alone sufficient to cure an exhausted patient! (Obs. VIII.). Finally, if pregnancy has passed the seventh month, we may induce premature labor with less hesitancy than abortion.

When, as too often happens, the mother dies (Tarnier, Cazeaux), the *post mortem* has revealed *nothing*; slight softening of the gastric mucous membrane was probably a mere result of the prolonged vomiting.

§ 4. CONSTIPATION; DIARRHŒA.—Constipation—not to be confounded with retention of feces—is a sympathetic derangement, very common at

the beginning of pregnancy. It is to be treated with injections, a relaxing diet, and if these are unsuccessful, with purgatives. Retention of feces is a mechanical trouble occurring toward the close of pregnancy, and is relieved only by injections through a long tube, whose extremity must be passed beyond the point where the cut is compressed by the lower segment of the uterus.

Diarrhœa is very rare ; it may alternate with constipation. As it predisposes to abortion and premature labor, it must be checked at once by the usual means.

### ART. III.—SECRECTIONS AND EXCRETIONS.

§ 1. SALIVATION.—Abundant salivation (*ptyalism*) has occurred in some women at the very onset ; it usually ceases the second or third month. Brachet, Danyau, and Désormeaux have noticed extreme and persistent salivation ; and some women seem predisposed during several successive pregnancies. Except in rare cases, this is not a serious matter. I delivered, at my polyclinic, a woman—seen by my students—who expectorated about a quart a day. She said she had “been that way” since the first month.

§ 2. THE URINE.—Women often suffer vesical tenesmus during pregnancy, from compression of the bladder by the womb, hence there is frequent desire to urinate. At times the act is painful, even impossible. This may occur at the onset, but is usually met with only at the end of pregnancy. It may even complicate labor. (See Chapter on Dystocia.)

During pregnancy, besides the antiphlogistic treatment, baths and emollients advised, we may hold up the womb by means of a body-bandage, and advise the patient to keep in the horizontal position as much as possible. In some cases catheterism is necessary.

Cazeaux records incontinence occurring at the end of pregnancy, from incomplete compression of the neck of the bladder. I have seen it in a primipara two to two and a half months pregnant : the urine was ammoniacal, and the meatus was within the vagina. This case was spontaneously cured at the beginning of the fourth month.

§ 3. PERSISTENT ALBUMINURIA.—Here I purpose to consider that albuminuria which persists, in varying quantity, in some women who are far advanced in pregnancy, and which constitutes a disease.

Transient albuminuria of pregnant women disappears about the eighth month, and is accompanied by no kidney change. Is this true of that marked albuminuria which continues after that period ? This is a difficult question to answer with our present knowledge.

Rayer, Devilliers, Blot, Imbert-Gourbeyre, Bach, and other Germans would have us believe albuminuria of pregnancy to be a sign of organic kidney disease, like ordinary Bright's. Gubler, indeed, has recently proved

that primary or secondary albuminous nephritis can occur during pregnancy, but that an excess of albumen in the blood, and increased arterial pressure in the kidney, can likewise induce albuminuria in pregnant females.

Moreover, as A. Charpentier states, pregnancy may occur in one who already suffers from albuminuria, or Bright's disease. This disease, although developed during pregnancy, yet bears its own peculiar characteristics.

The greater or less persistence of albuminuria after delivery indicates the true cause; it is certain that if there be kidney disease, albuminuria will not disappear from the urine in the few days following parturition.

This condition is often accompanied by serious nervous symptoms, eclampsia, uræmia, etc.; and anasarca often coexists. In mild cases the outlook is good; but when there is general dropsy, headache, derangements of sight, etc., we must be on the watch for eclamptic convulsions. When convulsions are imminent the temperature steadily rises.

If uræmia occurs, the temperature falls or remains stationary.

The treatment of albuminuria, when convulsions do not occur, consists in tonics, appetizers (bitter chiefly), and especially a *milk diet*.

Tarnier thus formulates: "First day, one quart of milk, two meals; second day, two quarts of milk, one meal; third day, three quarts of milk, one-half as much food as on second day; fourth day, and following, four quarts of milk, or milk whenever desired. No other food or drink."

§ 4. URÆMIA.—Most of the serious nervous derangements of albuminuria have been attributed to urea in the blood; and the poisoning that results has been termed "uræmia." Other substances, vaguely known as yet, occur in the blood with urea and give rise to *urinæmia*. Authorities differ on these subjects, as also upon accidents that may complicate albuminuria, Churchill and Imbert-Gourbeyre attributing puerperal palsies to albuminuria, while the majority of pathologists only recognize headache, derangements of vision and hearing, eclampsia, and coma as being dependent thereon. Uræmia and urinæmia appear in all cases to be but advanced stages of albuminuria, and they demand identical treatment.

§ 5. INFILTRATION OF CELLULAR TISSUE.—This form of dropsy, favored by the de-albuminization of the blood, is caused by pressure of the gravid uterus upon the adjacent parts, especially toward the end of pregnancy. It begins in the lower limbs and extends to the thighs and genitals. Later, dropsy may invade the visceral cavities, the face, and even the arms. It progresses slowly, as a rule, but may make a sudden appearance. The horizontal posture causes the cedema to disappear except when the disease is far advanced. Scarification, laxatives, and vapor baths cause it to disappear, Cazeaux advising tonics, especially iron. But after delivery this dropsy rapidly disappears, and albumen is no longer found in the urine.



§ 6. ASCITES.—Cellular infiltration, as already said, may precede fluid in the serous cavity of the abdomen; in the peritoneal cavity this fluid produces *ascites*.

Symptoms of ascites usually appear toward the middle of pregnancy. The belly is prominent, the navel projects, and the umbilical ring gapes widely at its base. Percussion discovers the fluid. In one case I saw the fluctuation stopped by the presence of an equally distended uterus. Again, this organ may be inaccessible from the distention of the abdominal walls; then foetal movements and the heart-sounds are very indistinct. Toward the close of pregnancy there is great dyspnoea, and the patient, who has to sit up night and day, is threatened with suffocation. Oxygenation is incomplete, respiration is "whistling," abrupt, and interrupted by fits of syncope, which cause the outlook to be graver the longer the condition has been present.

The treatment, expectant at first, consists in drawing off the fluid when the symptoms become threatening.

The puncture is dangerous because of the presence of the gravid uterus. Olivier d'Angers has successfully practised it over the umbilicus; but unfortunately, if pregnancy is not far advanced the fluid reappears. Repeated tapping will enable the woman to exist comfortably until delivery, when the cause will be removed. The apparatuses of Dieulafoy and Potani are useful here.

§ 7. HYDRAMNION; DROPSY OF THE AMNION.—This often accompanies ascites, and like it, may be a common sequence of general infiltration of the cellular tissue.

Toward the middle of pregnancy, fluid accumulates in the amniotic cavity; and when this is considerable, dangerous dyspnoea follows, especially if ascites coexists; the woman's life is in actual peril. Hydramnion induces premature uterine contractions which may lead to abortion. It may also interfere with labor.

The treatment is the same as for infiltration of the cellular tissue. It may happen that the condition will grow worse till the greatly distended uterus contracts and expels the ovum. After the seventh month, when the foetus is viable, we may avoid excessive distention by inducing premature labor by puncturing the membranes, either at their lowest part or above, by means of a catheter-needle, so that the fever will be moderate. Here, also, puncturing and aspirating are advisable.

§ 8. HYDRORRHŒA.—This is the condition where, at the end of pregnancy, water gushes from the genitals without contractions of the uterus. Only about one to three teaspoonfuls of fluid escape at a time, the discharge continuing night and day, independent of all exertion.

The fluid somewhat resembles the liquor amnii, and some think that the latter is its origin; but the integrity of the membranes disproves this notion.



The fluid is always yellowish ; it stains the linen and exhales a "semen-like" odor.

P. Dubois, Cazeaux, and others think it is secreted by the internal surface of the uterus, gradually separates the membranes, and finally appears in the vagina. Others (among them Mattéi), remembering that there may be two bags of water in some instances, think this fluid is situated between the amnion and chorion, in a small portion of the space occupied by the corps reticulate, that it erodes the chorion, and thus escapes.

However this may be, treatment demands rest in the horizontal position. If the abundance of the flow induces contractions, employ injections of opiate washes until the symptoms cease.

The integrity of the membranes shows that we are not dealing with rupture of the amniotic sac, leading to labor—an occurrence which sometimes happens.

§ 9. LEUCORRHOEA.—This is very common during pregnancy, especially toward the close. It is due to granulations on the cervix and vagina and hyper-activity of the genital tract ; hence it ceases after delivery.

But as digestive troubles may result from this flow, we must check it by baths, lotions, or by injections of bran-and-water. If the labia have been ulcerated by it, topical applications of lead or opium cerates are demanded.

#### ART. IV.—INNERVATION.

I shall not refer to the neuralgiæ, such as the symptomatic odontalgia of pregnancy. Usually these cease at the third or fourth month. If they persist and become obstinate, opium may be given. I calmed a dental neuralgia, in one instance, about the third month, by a ten-gramme dose of extract of opium. I think this a more certain plan than bleeding, as Mauriceau advises.

[In many districts quinine in full doses answers a good purpose, and is certainly less to be feared for any oxytocic tendency than the continuance of neuralgia would be.—Ed.]

§ 1. ECLAMPSIA.—This is a disease characterized by one or more convulsive fits, always ending in coma, with more or less complete abolition of the faculties and sensation.

In gravity it heads the list of puerperal affections. It destroys more lives than hemorrhage, in proportion to frequency. It may occur before or during labor, and is then a cause of dystocia. It has occurred after parturition.

*Causes.*—Predisposing and exciting.

A. Predisposing causes: Primiparæ. In ten cases eight are primiparæ. Persistent albuminuria, uræmia, and urinæmia. In the latter cases nervous symptoms are *very* marked. Many women have considerable albumen

in their urine but no urea in the blood, and these are not attacked with eclampsia. Of 50 cases of simple albuminuria 10 had eclamptic convulsions.

Any blood-change may be mentioned as a predisposing cause of eclampsia, especially the presence of carbonate of ammonia in the blood to the point of producing anæmia. Gubler, under the name of super-albuminosis, has advanced a theory of albuminuria into whose details we cannot enter. ("Albuminuria:" *Dict. Encyclo.*)

*B. Exciting causes:* Rickets (Dubois). The womb, not being able to grow, presses on the viscera and nerve-plexuses and induces eclampsia.

Plethora, cerebral congestion (Mauriceau), and renal congestion (Michel Peter).

Painful distention of the womb during pregnancy.

Pressure of the foetus in the uterine orifice during pregnancy.

Vigorous contractions, rendered inefficient by some obstacle.

Abnormal rigidity of the cervix.

Certain obstetrical operations.

Moral influences.

Heat of the room.

The emptiness of vessels after hemorrhage has been observed; so we may attribute post-partum eclamptic attacks to derangement of the general circulation in one already predisposed from emptying the womb of its contents.

*Prodromata.*—Prevention being the only effective plan of treatment, we must be prepared to recognize the symptoms which would usher in the attack. Unfortunately these are not always present, and the disease may occur most unexpectedly.

One of the most common signs is a violent supra-orbital headache, which begins a few days before the attack and is accompanied by nausea and vomiting. Syncope has occurred; also vertigo, flashes before the eyes even amounting to blindness, ringing in the ears, and deafness. Amaurosis seems to result, especially from urea in the blood. Chaussier has mentioned, as a precursor, pain in the epigastrium, occurring about once in ten cases. Bailly finds it present oftener than this.

*Onset.*—After the prodromata, or without them, the disease commences—the period of invasion. It may resemble an attack of epilepsy; the face changes color, its muscles work, the eyelids open and close rapidly, and the eye stares convulsively upward and is turned to the left. The tongue is protruded and often bitten. The face is twisted, there is foam about the mouth, often bloody, and extreme pronation of the arms, with the fingers closed and the thumb digging into the palm. This is the convulsive stage. We may divide it into two parts: at first the convulsions are tonic, but soon they become clonic, when all the muscles of organic life are strongly contorted. Increasing twitching and continual motion of the

limbs now follow ; and the pulse, which was at first firm and hard, now becomes feeble and almost disappears at the wrist. The respiratory functions are abolished, sensation is lost, and the face and body grow livid. The fit lasts from a few seconds to one or two minutes. Were it longer it would inevitably prove fatal. The urine and fæces are sometimes passed involuntarily. The womb itself takes part in the general convulsion—it contracts, and delivery rapidly ensues, sometimes without the woman or physician knowing it. Coma ends this stage.

*Coma.*—Now the breathing is stertorous ; the patient sweats profusely, and after a varying length of time she gradually emerges from the coma, gives a “dazed” look at those around her, and lies down, astonished to find herself in bed.

After a few minutes, or whole days, there may come another attack, also followed by coma ; then a third, and fifteen, twenty, forty, sixty, and even more have occurred.

When a fatal termination is to take place the attacks grow longer and longer in duration, and the intervals between them shorter and shorter, so that convulsions follow coma and coma convulsions. The final coma may last twelve hours before death occurs.

*Differential Diagnosis.*—It may be mistaken for *epilepsy*, *apoplexy*, *hysteria*, *cataplexy*, *tetanus*, and *acute alcoholismus*.

*Epilepsy.*—The two conditions resemble each other, as I have said, but an epileptic fit is rarely followed by coma ; the returns are separated by very long intervals, while on the contrary the attacks of puerperal eclampsia have short intervals, and these continue to grow yet shorter. Pregnancy seems to postpone or at least to diminish the intensity of the attacks in epileptic females ; witness the total absence of epileptic fits during labor and parturition.

But should we see the woman in the coma of epilepsy, which, as I have said, is rare, we cannot make a diagnosis without the previous history. But if, after a return of consciousness, another fit followed by coma supervene, we are dealing with a case of eclampsia.

It has been stated that the presence of albumen in the urine indicated impending eclampsia. Now, besides the fact that all who have eclampsia have not albuminuria, it is true that some epileptics have albumen in their urine. Still, the presence of albumen will have great weight in the solution of this important question ; for eclampsia is a very grave, acute malady, whereas epilepsy being chronic is far from being so dangerous.

*Apoplexy.*—It is the *coma* of apoplexy which may be confounded with that of eclampsia, epilepsy, and even of acute alcoholismus, when we have no previous history. But the fall in apoplexy is never preceded by any convulsive movement. Usually we can find evidences of some fall upon the head ; but it is by hemiplegia above all that we recognize an apoplectic seizure. The deviation of face, tongue, lips, etc., can usually also be

made out. Yet it may happen that the apoplexy has been induced by the congestion of the eclampsia, and then we shall have both conditions occurring together.

*Hysteria*.—Here the diagnosis is not so difficult. A “nervous attack” in an hysterical female is, indeed, always preceded by the “globus hystericus,” and during the attack the intellect and sensorium remain intact (indeed, the senses are often abnormally acute). There is no foam about the mouth; the limbs jerk convulsively, they “bound about,” and there is a tendency to opisthotonos. The fit does not end in coma, but in a burst of tears, with hiccough, “yawning and stretching.”

*Catalepsy*.—This is very rare. Pen cites one case where a woman was stricken with the malady on seeing her child fall down a flight of stairs. The ecstatic posture will decide the case.

*Tetanus*.—This does not occur in our climate without surgical lesions, themselves enough to establish the diagnosis. The cases of puerperal tetanus recorded in Dr. Lardier’s thesis (Paris, 1874) are all consecutive to delivery or abortion.

*Drunkeness*.—We may meet with difficulties in this instance. But the absence of the prodromata and of eclampsia, with the characteristic odor of the breath, will put one on the right track. If the patient is in the coma of intoxication, smell is the most available means of diagnosis. We may induce vomiting of the ingested material by tickling the pharynx. It must be remembered that drink may lead to convulsions in those who are predisposed thereto. Here the previous history is important.

*Frequency*.—Puerperal eclampsia is rare. Pajot found it once in 350 cases; Hyernaux, 20 times in 6,370 cases. Its frequency varies with the period of pregnancy; in 200 cases of eclampsia 60 began during pregnancy, 100 during labor and delivery, and 40 during the puerperal state.

The first attack rarely appeared before four and one-half months. Yet one case began directly impregnation occurred, and the woman died during labor with an attack. During labor fits have been chiefly noticed at the end of the first and of the second stages. Post-partum cases appear thirty minutes, one hour, or even a day after delivery.

Some infinitely rare cases, not reckoned in with the forty cases occurring in the puerperal state, seem to prove that we may fear this malady days, even weeks, after parturition. (*Gaz. Obstet.*, 1872, No. 4.)

*Prognosis*.—No more serious malady could occur during pregnancy, except rupture of the womb.

In 42 cases (Mauriceau) death occurred in 21; in 21 (Velpéau), death occurred in 8; in 26 (Pajot), death occurred in 12; in 20 (Hyernaux), death occurred in 8.

Women who lived were predisposed to puerperal fever. The foetus died in 10 out of 16 cases, and if it did not die during the fit, it had fatal convulsions within three days after its birth.



Hyernaux states that epileptic convulsions are less to be feared than those occurring in one who has never had the falling sickness. When occurring in primiparæ during gestation it is the more grave according as labor is remote, and as the condition of the cervix offers impediment to the emptying of the womb.

Convulsions associated with general serous infiltration are equally dangerous, since we dare not employ active antiphlogistic treatment.

At the beginning of labor convulsions are more dangerous than after the cervix is dilated so as to permit the exit of the fœtus. The more numerous the attacks and the more prolonged the coma the worse the outlook. When coma and convulsions merge the danger is *very* great; yet recovery has occurred in such cases. But coma lasting twelve to twenty-four hours without any convulsive seizures should lead us to abandon all hope.

But when the attacks grow infrequent the prognosis is more favorable, and when convulsions occur during parturition, if milk appears in the breasts after the last coma the prospect of recovery is good.

*Termination.*—Convulsions may be followed by perfect health, by death, or by some disease. The latter may be puerperal fever (which more frequently follows this than hemorrhage), puerperal mania, derangement of intellect, loss of memory, dumbness, hemiplegia (from cerebral hemorrhage), congestion of the lungs, rupture of the uterus, etc., etc.

*Pathological Anatomy.*—Post-mortem examinations have discovered nothing in the majority of cases. Injection of the spinal membranes may induce a marked reddening along the whole length of the cord, even when the cerebral meninges are normal; and this discovers, to Van Heuvel, the starting-point for the disease. For ourselves, we only see in this a *result*, not a *cause* of the malady.

Osseous growths have been found in the brain; but these occur in a large number of pregnant women. We must look to the kidneys for the lesions of Bright's disease.

Cazeaux states that in nearly all the autopsies on women who die of puerperal convulsions he has been able to find the lesions of an albuminous nephritis in greater or less degree.

Depaul and Blot did not find them, but they did not examine microscopically, which accounts for their failing to observe the *first* stage in the kidney changes. Further research is still necessary.

*Treatment.*—This is *preventive* or *curative*. The preventive treatment is the more important, for once an attack occurs treatment is of comparatively little avail. Moreover, it is medical or obstetrical according to the means employed. In these cases the accoucheur *must* be a physician, and midwives, when they have a case, cannot be too careful as to the physician they call in.

Furthermore, views are very dissimilar, and men of the highest standing uphold opposite theories. (Depaul, Peter, Jaccoud.) Now, since all

treatment directed against a disease with such a varied etiology would be perfectly irrational were the same means employed in all cases, we must first search for the cause. We can only outline the plan of the methods usually employed.

I. *Preventive Treatment*.—A. *Medical*.—When a predisposition to convulsions is suspected, especially if mechanical causes are at work, bleed from the arm, and continue this if the prodromata persist. Give saline purges in small doses, to let the abdomen “have all the liberty possible.” If there is serous infiltration employ diuretics; but do this judiciously, for as Cazeaux states, in increasing the urine we de-albuminate and hence impoverish the blood. Yet if the patient's urine is scanty squills or digitalis may be given to prevent blood-poisoning. Revulsives to the lower limbs may be useful, and rest and a bland diet are to be ordered. *But if extensive blood-changes* exist and their nature be known, far from employing antiphlogistics the physician is to adopt a plan I cannot give in detail, but which is based on tonics (as iron and quinine), and an endeavor to rid the blood of the toxic matters.

The benefits of a milk diet in Bright's disease led Dr. Tarnier to think it would be useful in eclampsia. (See Art. “Albuminuria.”) Hence in his service at “La Maternité” Hospital, in Paris, the house surgeon has for years given this diet to pregnant women whose urine contained albumen. In all his cases albuminuria has disappeared or rapidly diminished, and convulsions have never occurred. But in all these cases the milk diet has been given in time, the quantity taken being increased from one to four quarts a day. This, then, should enter in the preventive plan of treatment.

Unfortunately we know that uræmic convulsions (ammonæmia and urinæmia) may be beyond the reach of all treatment.

B. *Obstetrical*.—Thirty years ago P. Dubois induced premature labor to avoid convulsions and preserve the child from almost certain death. He has recently discarded this plan on account of the dangers of premature labor, and also from the fact that convulsions have occurred after delivery, apparently proving that uterine development has nothing to do with them. Yet when convulsions determine uterine contractions he would not interfere, but rather let parturition proceed.

We must state that all practitioners do not believe as P. Dubois' pupils do. Chaillly, in his book, contends for premature delivery. Tarnier himself seems to recant his judgment on Cazeaux (“*Traité d'Acc.*,” p. 825), and Joulin shares Chaillly's opinions.

If we reflect how sure are the methods of inducing premature labor in the present state of science, P. Dubois' chief objection is removed. But since, to-day, we know (1) that compression of the renal veins may induce albuminuria; (2) that de-albumination of the blood induces fatal uræmia; (3) that the presence of urea in the blood or other and more advanced stages of poisoning may be followed by convulsions and their train of

symptoms, it seems absolutely proved that by shortening the duration of pregnancy compression of the renal veins will cease, elimination of albumen from the blood will be checked, and also uræmic poisoning and its results—all of them common causes of convulsions.

[From the line of argument advanced by the author there would be but little disagreement at the present day. It would be well to emphasize the fact that premature delivery is not called for except in grave cases, with marked subjective indications of uræmic poisoning, and after thorough deliberation.—Ed.]

II. *Curative Treatment.*—A. *Medical.*—When the attack begins we still may bleed, preferably by leeching, over the mastoid processes. This, though not checking an attack, prevents cerebral and pulmonary congestion and apoplexy. Belgian obstetricians, following Van Heuvel's theory, apply, after several venesections, leeches to, or dry cups over, the spine, the woman lying on her side. In this position cold affusions may be applied along the spine, ice may be put about the head, etc., etc. Chloroform has been followed by beneficial results; it shortens the attack without curing the malady or its cause. But as it is not without danger, hydrate of chloral is to be preferred. This has given excellent results (Dr. Bourdon) during the fit, and as yet no untoward results have occurred to dampen the zeal of its partisans, despite the chemical theory that in the economy it decomposes into chloroform and other substances. Charpentier advises four-gramme doses of (gr. lx.) hydrate of chloral in 100 grm. of quince-mucilage injected three, even four times a day, till the convulsions cease, depending on the tolerance of the patient and the effects produced.

In case of recovery he gave 12 grm. (180 grains) of chloral to the woman within ten hours. He never ceases abruptly in this plan of treatment, but gradually diminishes the doses before final discontinuance.

During coma it would not be advisable to use chloral or chloroform; but a drastic purge should be given in small compass, *e.g.*, pulv. jalap. comp., combined with calomel, placed in the patient's mouth. Care must be taken lest the patient bite her tongue, which is often thrust out of the mouth; it must be pushed back behind the jaws, which are to be kept apart by little pieces of wood wrapped in linen and tied with strings connected with some portion of the patient's dress, so that she may not swallow them. The wood is better than a handkerchief. If the patient cannot take calomel give a purgative injection, *e.g.*, sennæ, grm. 15 (3 iv.), and sodæ sulph., 20 gr. (3 v.), in 250 grm. (Oss.) of water, and it will have the desired result.

Sinapisms should always be applied to the lower extremities, their site changed every fifteen minutes, for the woman in coma does not feel the heat and the part does not always redden. Cazeaux advises Junot's boots to the thighs, left on for about four hours.



B. *Obstetrical*.—The conduct of the obstetrician depends upon the degree of dilatation of the cervix.

During an attack, if the orifice is not dilated and if labor is advancing normally, there is nothing to do; but when the cervix is incompletely open and the presentation has been made out to be favorable, rupture the membranes if labor is going on slowly, so as to diminish uterine tension. The mere exit of the liquor amnii has been seen to calm an attack, especially if there has been very great uterine tension.

When the orifice is dilated, the membranes ruptured, and labor is advancing, we should wait. But if labor is tedious—a frequent occurrence in primiparæ—we must put an end to labor, but *never by employing undue force*. If the head be yet movable in the superior strait, practise podalic version; but when, as is usual, the head is engaged, use forceps and ergot.

Opium to calm the attack is irrational and harmful.

[In this country we have been brought by clinical experience to regard morphia sulphas as an important remedy. When given in doses of one-third of a grain every two, three, or four hours, it calms the nervous system, promotes the action of the skin, affords relief to the kidneys, and appears to be directly antagonistic to the poison of uræmia.—ED.]

In post-partum convulsions hasten to deliver the placenta or intra-uterine clots, and then treat the cause.

We wish to call attention to the statistical table of puerperal convulsions at the Hôpital des Cliniques, from January 1, 1834, to January 1, 1872—133 cases. This, the work of Dr. Soyre, is in the “Leçons de Clin. Obstet.” of Professor Depaul.

§ 2. DISTURBANCES OF INTELLECT.—These vary from oddities to actual madness. The latter is most frequent in women just delivered, and then it belongs to puerperal pathology, often terminating in attacks of convulsions. Marcé records twenty-seven cases occurring during gestation. According to him the commencement is very variable, and in the larger number of cases the invasion of the disease coincides with fecundation. Melancholia is the commonest variety. Recovery almost always occurs with delivery.

A transient mania has been noticed to suddenly appear during labor from the pain. A case is recorded by Cazeaux where, at the moment the pains became expulsive, the woman commenced to sing the overture to “Lucia di Lammermoor.” Some women have hallucinations and delirium.

Usually intellectual troubles, beyond the physiological, consist in a desire to steal fancy articles of food, and at times valuable trinkets, although the woman is able to buy whatever she pleases. Women have been seized with a craze to buy all day long, especially toilet articles; others, more melancholy, prepare for death, and speak of it to friends as a foregone conclusion.



Hence women may get into court, and fine legal points may arise wherein the expert must be on the lookout for malingerers, who alone should be punished, for a pregnant woman with mania is not a free agent.

§ 3. PARALYSIS.—Only recently has puerperal pathology been enriched by studies on paralysis. F. Churchill and Imbert-Gourbeyre have been the chief contributors to this branch. The former has collected twenty-two cases of paralysis occurring during pregnancy. There was both hemi- and para-plegia. A few cases of local palsy occurred with the hemiplegia. Churchill noticed two cases of amaurosis and three of deafness that occurred during pregnancy. They began in the latter months, and except in one—a fatal case—ceased almost as soon as parturition occurred, or a few days thereafter.

The causes are said to be cerebral and meningeal apoplexy pre-eminently, then albuminuria, especially uræmia, to which cause the authors just named ascribe nearly all the cases of puerperal paralysis.

Anæmia following great loss of blood has a marked ulterior influence on the production of paralysis. The prognosis and treatment depend on the cause and the kind of nervous lesion that is present.

For all uræmic symptoms, and for those following extensive hemorrhage, give tonics. Hemiplegia following apoplexy is only to be treated long after its commencement, by means common to internal pathology. Paraplegia apparently due to pressure on the head of the nerves during labor will disappear of itself in a short time.

#### ART. V.—CIRCULATION.

*Puerperal Hemorrhages.*—We have noticed under functional changes the production of varices in the lower limbs and about the genitals. These sometimes develop thrombi not only dangerous to the mother but obstructing the exit of the fœtus. This will be considered under the head of “Dystocia.”

Here we wish to discuss hemorrhage during pregnancy as a derangement of the circulation. Before the sixth month hemorrhage may lead to abortion (the subject of § 1). § 2 will be devoted to the study of hemorrhage occurring in the last three months and during labor. Post-partum hemorrhage will be considered under the complications of labor.

§ 1. ABORTION ; MISCARRIAGE.—This is the expulsion of the products of conception before the time of legal viability, *i.e.*, the 180th day (six months, Article 314 of the French *Codecine*). Science has proved that the fœtus has no chance of life until after the 210th day (seventh month). I had a case, however, of a child who was born at six and a half months and who lived. But such cases are too rare to count upon.

*Classification.*—Velpeau divides abortions into spontaneous and acci-

dental; the former occurring apart from any external cause, the latter being the result of a blow, fall, etc.

A more philosophical division is that of P. Dubois, according to the time of occurrence, and hence the size and development of the foetus.

Thus he describes (1) *ovular* abortion, from conception till the sixth week, the ovum being yet, so to speak, rudimentary; (2) *embryonal* abortion, from the sixth week to the third month, where the embryo is palpably formed; and (3) *foetal* abortion, from the third to the sixth month. The latter is a miniature labor; the foetus may live a few hours, but it invariably dies speedily.

*Frequency.*—The frequency of abortions is far greater than one would first suppose, if, for instance, we notice how in the hospital clinics the histories of many women show that they seldom seek treatment for abortions. Lachapelle records 118 abortions in 22,000 accouchements. Hospital abortions are nearly always foetal abortions; women remaining at home for abortions occurring in the early weeks, mistaking them for delayed menstruation, followed by a more abundant flow than usual on that account. Baudelocque, indeed, regards each monthly flow as but a little abortion.

Abortions are met with most often in the newly married; the reason is plain. Finally, then, from a general standpoint it may be stated that abortion is more frequent than delivery. (Pajot.) The proportion is difficult to make out. Debay states it is as 1 to 12, Velpeau 1 to 3. It is especially in the early weeks that this accident happens, and the danger is greatest when it occurs at the time for a menstruation. In resorting to prophylaxis the knowledge of this fact may prove useful. Women who marry late in life, by reason of their habitual menstruation are, more than others, liable to abortion, especially in the earlier months.

*Causes.*—The causes are difficult to appreciate. Pajot makes four classes: (1) Predisposing; (2) accidental or exciting; (3) special; and (4) efficient causes.

*Predisposing Causes.*—These may be maternal, may belong to the ovum itself, or be due to the father. The maternal causes are general or local.

*Maternal: General Causes.*—The constitution of the woman; the very strong and the very feeble; those of decided temperaments, as the sanguine, nervous or lymphatic. The hygienic conditions of the woman are also to be considered; those who lead a life of pleasure, who frequent balls, theatres, etc., where the air is foul, and especially when such are nervous women who are impressed with and have their emotions aroused by the surroundings—these are predisposed to abortion. At the other end of the social scale, women who lead a life of debauchery, those who are in shops and have but little exercise, those who dwell in mountainous regions (Saucerotte), and Europeans who have removed to a warmer climate and have become subject to metrorrhagia, are predisposed to abortion.

Epidemics of abortion have been described ; I think they precede other epidemics. Before the cholera epidemic of 1866 Mattéi noticed large numbers of abortions, the children dying *in utero*. This author ascribes this to atmospheric influences, which also manifest themselves by anginas, bronchitis, and precursory choleraic diarrhoea. I noticed this during the last cholera epidemic in Paris, which appeared so abruptly. (*Gaz. Obstet.*, No. 20, 1873.) The miasm appears to act on the product of conception, and the epidemic of abortion is but a sign of the prevailing condition of body and blood.

Among the general causes of abortion we may mention acute and chronic diseases, and in the former the eruptive fevers occupy the first rank ; small-pox is especially dangerous, even though the woman has been vaccinated ; if she has not been vaccinated recently, she almost invariably dies. The foetus contracts the disease in the mother's womb ; and children have been born with it when the mother has been exposed to the contagion but has not herself contracted the malady.

Pneumonia, pleurisy, bronchitis, typhoid fever, and cholera make the prognosis grave, for after abortion the disease progresses and complicates the puerperal state. ("Prognosis and Treatment of Pneumonia during Pregnancy," Verrier, 1866.)

Among chronic diseases, phthisis, even when it appears ameliorated by pregnancy, returns with increased gravity after parturition and rapidly compromises life. Constitutional syphilis, when not a cause of sterility, usually induces abortion, due to syphilitic infection, and not to mercurial treatment, as has been stated without reason.

Certain pursuits seem to influence abortion, *e.g.*, where lead is much used. (Dr. C. Paul.)

*Local Causes.*—Deformities of the pelvis, such as a large cavity having a narrow constricted superior strait, predispose to abortion. An irritability or rigidity of the womb has been noticed, whereby it cannot contain the product of conception beyond a certain period. Adhesions or **other** pathological states may also lead to abortion.

*Causes Situated in the Ovum.*—The human ovum embraces the foetus and annexes. The foetus may have diseases peculiar to itself or suffer them with the mother. Even surgical diseases have compromised the life of the child. Lesions of the appendages or of the placenta may induce abortion. (A. Charpentier.)

Among foetal diseases are intra-uterine rickets, small-pox, ichthyosis, syphilis, pneumonia, epithelioma, peritonitis, ascites, hydrocele, hydrocephalus, hydrothorax, all foetal lesions that augment its size, etc., etc. Certain predisposing surgical conditions are especially to be named : wounds, fractures, congenital dislocations, ankylosis, amputations, etc. Diseases of the appendages may lead to death of the foetus and to abortion, *e.g.*, inflammation, mole or hydatidiform degeneration, and exuda-

tions, especially sanguineous exudations, which constitute the most frequent class of causes.

The mental emotions of the mother react on the uterus and accelerate the circulation. A number of the placental vessels may rupture, and then there is an exudation of blood into the organ, detaching it at that point. External causes may also produce these effusions. When slight the clots may check the hemorrhage, and no evil results will follow; but when several hemorrhages occur in the substance of the placenta, or when there is one large one, the fetus may not secure nourishment enough, and may die, when it will act like a foreign body. But if abortion occurs, and the child is alive, it is rather to be ascribed to an extensive detachment whereby the clot becomes the foreign body; the uterus expels it and the fetus too.

These extravasations are described by Jacquemier as placental apoplexies. Sometimes the hemorrhage recurs, and the oftener this happens the more liable is the woman to abortion. There are multiple foci in such cases, each distinct from the other, and the state of the contents indicates their progressive formation. They are found at varying depths, the peripheral tissue being normal.

Apoplectic foci may be found at the centre of those cotyledons whose villousities have become the seat of fibrous obliteration. The foci are then very small and regular, containing clots that look like raisin-seeds. (Jacquemier.) The clots may be pediculated or flattened.

In old extravasations the fluid portions infiltrate the placental tissue and disappear, while the solid residue shrinks, becomes firmer, and is surrounded by a yellowish layer. The clot diminishes more and more, becomes paler, and is finally absorbed.

Whitish homogeneous masses found in diseased placentas resembling agglomerations of pus or tubercle have been ascribed to successive changes in the clot; but the former are only villi of the chorion that are impermeable, and therefore suffer fatty degeneration.

Since certain women are predisposed to placental apoplexy, and have aborted five or six times in succession, we should always examine the appendages in every abortion, so as to use proper preventive measures concerning uterine hemorrhage in their next pregnancy. This is often the only means of diagnosis of those slight hemorrhages that are revealed by no palpable symptoms.

Again, abortion may be induced by certain mechanical changes in the cord (knots, twists, etc.), which lead to its fracture or arrest the circulation, thus inducing death of the fetus.

Dropsy of the amnion and diseases of the umbilical vesicle or membranes of the ovum may also cause it.

*Paternal Causes.*—Causes due to the father are constitutional, *e.g.*, syphilis and tuberculosis at the moment of generation. The former almost



always induces abortion, and it is especially the hard chancre that infects woman and child, and which must be treated in the father. Diseases or prolonged convalescence may alter the quality of the semen, and extreme youth or old age may do the same.

#### EXCITING OR DETERMINING CAUSES.

Such are mental emotions, especially when they are unexpectedly induced in one who is predisposed to abortion. When the latter condition does not exist serious accidents may occur, and yet the woman will not miscarry. Blows on the belly and falls are frequent exciting causes.

Cazeaux, however, records a case of a girl five months pregnant who threw herself into the Seine from the Pont-Neuf, on account of abandonment by her lover, and who yet, after rescue, carried her child to full term.

I saw a woman six months pregnant fall from the third story upon a pile of window-frames, which she broke to pieces; besides the fall she was covered with contusions and wounds; she kept her bed six weeks, yet finally gave birth to a feeble, but living child. Porak—of the Saint-Louis Hospital—records a case where a woman was knocked down and run over by a carriage. She was covered with contusions and the child died, yet pregnancy continued.<sup>1</sup>

Such cases are not rare; and, as Pajot says, unrecognized pregnancies have been treated by the most violent means, even cauterization of the cervix, without producing abortion, while in those who are predisposed thereto it will follow a clumsy snuffing of a candle.

Dionis and Mauriceau question whether coitus during pregnancy can determine an abortion; it can only be harmful toward the close of pregnancy, yet it must not be forbidden in the case of ardent females.

#### SPECIAL CAUSES.

Here are classed all those drugs or operations destined to induce it from any motive whatever.

#### EFFICIENT CAUSES.

An abundant menstruation may induce abortion, inducing, as do falls and blows, uterine contractions. The latter may, again, be induced by some acute disease, death of the foetus, adjacent irritation, etc.

*Symptoms and Diagnosis.*—Based upon the symptoms, diagnosis should

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<sup>1</sup> This woman died two months after the close of her pregnancy. The post-mortem revealed rupture of the uterus at its antero-superior portion, and the foetus was encysted and was commencing to suffer fatty degeneration.

embrace two very distinct classes. In the first—from the third to the sixth month or foetal abortion—the diagnosis is very easy, for the symptoms are those of labor in miniature. But in the second—before the third month—it may be so difficult that after treating and curing a woman we yet cannot say that she has had an abortion.

We must first find out whether she is or is not pregnant; and as certain positive signs are wanting in early pregnancy, we are not able to make out the woman's condition so as to arrest the miscarriage.

If she is pregnant we must distinguish signs of a commencing abortion from those of a simple uterine congestion. Finally, we must know whether the ovum is completely expelled or not.

If after intermittent pain touch discovers an opened cervix through which membranes can be felt to engage at each contraction, and if hemorrhage occurs with these pains, the chances are all in favor of an abortion. There are cases in which the uterus is enlarged, the menses suppressed, the hemorrhage abundant, and the pains intermittent; but the cervix being intact the hemorrhage will cease when properly treated.

Diagnosis is still more difficult in those who have not menstruated for six weeks, but who habitually suffer from dysmenorrhœa. In such a case the flow would be greater than usual, there would be no sign of pregnancy upon inspection of womb and cervix, and no mammary symptoms. In cases of doubt, Lachapelle states that to distinguish between pregnancy and dysmenorrhœa we must consider that in the first case the woman bleeds before she has pains when abortion threatens, and that as the flow increases pain increases; while in the second case pains occur first, then hemorrhage, and as the flow increases the pains subside.

The physician is rarely present at the commencement; but when he arrives he must look at the blood lost, put the larger clots in a glass without breaking them, and then pour water upon them to facilitate an examination to see whether they contain the embryo or its appendages. Upon practising touch, if the external orifice is opened and the internal closed the abortion is probably over; but if the os internum be open and the membranous ovum cannot be felt the abortion is only partially completed, the placenta yet remaining in utero. A clot may be arrested within the cervix and is a frequent indication that delivery is incomplete.

To recognize a clot one must make out that the little mass is smooth but friable, while the placenta would be granular and tough. We can make out whether the abortion is complete by inspecting the débris of the ovum; and we must be careful not to leave a part of the placenta or the membranes in the uterus.

These foreign bodies may induce hemorrhage and, what would be worse, putrid infection. If the cervix closes after expulsion of the foetus, continued discharge of blood and fetid lochia will nevertheless indicate to the physician that all is not over. Abortion is inevitable if the foetus is

dead and the membranes are ruptured, or where the placenta is so extensively detached that what is left does not suffice for foetal respiration.

The amount of blood lost, much more than the duration of the flow, tells how extensive this detachment is. Cazeaux gives as a sign of inevitable abortion the shape of the cervix, whose cavity is then directly continuous with the uterine cavity, there being no line of demarcation at the os internum.

*Progress and Termination.*—Abortion may be exceedingly rapid. A woman may fall and get up with the foetus in her clothes, though this is rare. Again, it may last from two to three weeks with alternate contractions, rest, and hemorrhage. Between these extremes are many varieties. It may end in the expulsion of the foetus with but part of the appendages, especially at the fourth or fifth month, for previous to this time the entire ovum is usually expelled. In twin pregnancy one foetus may be expelled and the other may, with the placenta, remain and develop.

*Prognosis.*—Abortion is always fatal for the foetus, since it is born at a time when it is not viable.

Concerning the mother there are three things to be considered : (1) Is abortion generally a grave accident? (2) Is it more dangerous than normal delivery? (3) Is there any one time when it is most dangerous?

The large number of abortions that occur in the early weeks are not dangerous, except when due to general diseases, to attempts made by the ignorant to induce them, or to accidents, and the prognosis depends more on these accidents than on abortion itself.

Upon the second point, despite the dictum of Hippocrates, we may say that abortion is not so serious as childbirth with the pain and the hemorrhages that so often accompany, and the puerperal diseases that may follow it. Is not abortion proposed to avoid labors that we foresee will be difficult? Puerperal diseases are rare after abortion; and if hemorrhages do occur, they are never so terrible as after labor, when they arise from *inertia uteri* or an abnormal implantation of the placenta. Displacements of the womb do not so often follow abortions, while the more frequent use of instruments in term labor renders the latter dangerous. From all this we conclude that abortion is not as serious a state as labor, especially when it occurs in the early months.

Yet the Father of Medicine held a view supported by the fact that abortion has an evil influence on future pregnancies as to their arriving at full term, and that the placenta is quite frequently retained.

Finally, the most dangerous period is between the third and fourth months (Cazeaux), the placenta then being most liable to be retained. The membranes and placenta are then much larger than the foetus, whose exit is followed by a longer or shorter period of rest. Revived contractions are necessary to end the abortion, but neither cervix nor body has as yet acquired that degree of organization capable of producing this result;

hence twenty-four to thirty-six hours or more may elapse, the woman meanwhile being exposed to the chance of putrid absorption.

*Treatment.*—This is preservative or curative, according as we wish to prevent abortion or remedy those accidents that accompany it.

*Preservative.*—We must find the cause and combat the predisposition in the intervals between pregnancies. Lymphatic women should exercise in the country, etc., and when they become pregnant bleeding is necessary. In the plethoric, rest in bed in the supine position is demanded, the head is to be kept low, repeated bleedings are called for, and syncope is to be avoided. If during pregnancy the woman is seized with some acute disease, we must bleed vigorously. [We should vigorously object to these recommendations to bleed.—Ed.] I have found ("Reports to the Academy in 1864") that there was nothing to prevent our treating pneumonia in any manner we saw fit. Chronic diseases demand appropriate treatment, especially syphilis, whether in father or mother. There is nothing to fear from mercury. Precautions are to be taken against displacements of the womb, and all occupations likely to induce such are to be changed. If the uterus is irritable, baths, opium, venesection, and a bland diet may be ordered; while if the woman be weak and feeble, order tonics, cold baths, and chalybeate waters.

If in plethoric women an examination of the placenta in an abortion causes us to fear—in a subsequent pregnancy—metrorrhagia or placental apoplexy, order rest in bed and small bleedings at the time when the menstrual flow would have come on; also forbid coitus, attendance at balls, theatres, etc. Rest from the latter excitements should be ordered for a year, if necessary, when abortions have occurred several times in succession. If the woman again becomes pregnant she must cease all marital relations during that pregnancy.

Sometimes these prophylactic measures are insufficient to prevent abortion, and we have then to consider the curative treatment.

*Curative.*—There are three classes of cases to consider. (Pajot.)

1. When one is sure that an abortion threatens; it has not yet occurred and ought not necessarily to come on. Then we are to arrest it.
2. You are sure of an abortion either partially or completely finished, or one that is inevitable. If not complete, aid it; if finished, treat symptoms.
3. If we are doubtful as to an abortion we must act as though one were going to occur and use such measures as would be suitable to stop it.

#### *First Case.*

To check the abortion. The woman has uterine and lumbar pains and is bleeding; we know that she is pregnant. At once put her to bed and ascertain whether the membranes are intact and whether the child still moves. If these questions are answered affirmatively we must not despair of arresting the abortion, however great the hemorrhage may have been.



If the event is over, nothing can be done except to combat hemorrhage by general and local measures.

#### TO CHECK HEMORRHAGE.

*General Means.*—1. Position. Place the woman on a hard bed, with her head low, the buttocks raised and resting on a large book or a hard plank. [Or secure the same result by elevating the foot of the bed.—ED.]

2. Cold. The temperature of the room should be low, but the air should be fresh rather than cold, especially if the woman has bled much. No fire, fresh air, and small quantities of cold, acidulated drinks.

3. Venesection. Great circumspection; never bleed with extensive hemorrhage but only when a moderate amount has been lost and the woman is plethoric. [Or, better, not at all.—ED.]

4. Empty bladder and rectum; give a cold-water injection. [Hesitate before the use of the latter measure, for it is apt to excite uterine action.—ED.]

5. Ergot. Some give it as a hæmostatic; but as contractions are occurring with the hemorrhage it is dangerous and we do not believe in it.

*Local Means.*—1. Cold. Cover the chest well, but only have a light covering over the abdomen. Velpeau advises sinapisms between the shoulders; cool compresses upon the vulva and internal surface of the thighs, renewed every five minutes and applied for a long time. The chill and shock which they induce are very favorable. Ice and snow within the vagina produce unpleasant reactions and are to be abandoned.

2. The Tampon. Before tamponing all other means should have been used. The tampon is a plug stopping the flow and facilitating the formation of coagula, which increase the energy of the contractions and inevitably promote the abortion.

(Concerning subsequent treatment see the second class of cases.) To tampon is to introduce in the vagina something capable of arresting hemorrhage. The kite-tail tampon, the emergency tampon made with handkerchiefs, napkins, strips of cloth, etc., and Gariel's india-rubber pessary may be used; but the classical tampon is the best. It may be applied with or without the speculum. A hatful of lint should be prepared to completely distend the vaginal folds. Ovoid masses of lint about the size of a walnut are tied together by pieces of string about a foot long; and pieces of touchwood similarly tied together are to be placed within the lint. All physicians should have a tampon thus made ready at hand so as to avoid loss of time.

The woman lying crosswise on the bed, the legs resting over two chairs, while the thighs are covered and held by the assistants, a glass of cold water is poured down into the speculum. Pajot recommends the solid large speculum. One of the pledgets is to be dipped in perchloride of iron, and with a pair of forceps placed over the cervix. Then five or

six bundles of lint are to be placed at the fundus of the vagina. Before making another layer of lint withdraw the speculum slightly, and pack down the first one. Then put in a layer of touchwood, then another layer made up of balls of lint which have first been dipped in simple cerate, care being taken to fill up all the chinks ; hence pack down the lint as the speculum is withdrawn. An easier proceeding to my mind is to use the left hand introduced (except the thumb) into the vagina, and to insert the dossils (previously dipped in carbolated cerate without perchloride of iron, but all tied together with a string left hanging out of the vagina) by means of a forceps held in the right hand, and to pack them down, stuffing the vagina *until the vaginal walls are pressed against the pelvic bones ;* no speculum being used.

The bladder and rectum are first to be emptied. When the vagina is packed up to the vulva, a long compress is placed thereon tied by a T-shaped bandage around the body.

[The patient lying on her side, with the Sims speculum the vagina is best opened for the reception of a perfect tampon. Among materials for the plug, none could be mentioned superior to small balls of common lamp-wick.—Ed.]

Effects of the Tampon. It acts as a mechanical dam to the hemorrhage. The blood stopped at the cervix accumulates within the uterine cavity, finally to obstruct the gaping vessels. As long as the ovum is intact there is no danger of the blood filling the uterine cavity ; but if the membranes are ruptured and the fœtus expelled, the tampon cannot be used. The tampon also starts uterine contractions, for the blood forms a clot which in turn acts as a foreign body.

How long should a tampon remain ? When the bladder and rectum are empty leave it in as long as the woman can bear it ; it should be taken out when she wishes to micturate, or when we judge that the hemorrhage has ceased. In either case, if the hemorrhage recommences and the cervix is not dilated, apply it a second, even a third time if necessary.

Disadvantages of the Tampon. The tampon should only be employed when we cannot possibly check the abortion, or when the mother's life is in danger from hemorrhage. Hence the tampon is said to cause those very symptoms, *e.g.*, hemorrhage, which it is used to check.

3. Evacuation of the Uterus. Never use violence, whatever be within the womb. Rupture the membranes at the fifth or sixth month—never before the fourth—and extract the fœtus.

#### TO CHECK CONTRACTIONS.

Rest in bed ; no excitement ; venesection if the woman is plethoric ; and after having given a purgative injection to empty the intestine, administer every fifteen minutes an injection (rectal) of two or three ounces

of warm water containing fifteen drops of Sydenham's laudanum until the contractions cease.

From sixty to eighty drops of laudanum may be given internally in the twenty-four hours. All agree upon the great tolerance exhibited by pregnant women for opium; yet upon the first sign of narcotism, stop it and give strong coffee and acidulated drinks. In former times opium was given by the mouth, and no doubt with success; but this has given way before rectal administration, which in spite of some failures is to-day the prevalent plan.

### *Second Case.*

*Aid the attempt at abortion or treat symptoms.*

In every way we aid the abortion; combat hemorrhage by the tampon, which is to be unhesitatingly applied. If this is contra-indicated by dilatation of the cervix and rupture of the membranes, give ergot and proceed to empty the womb. When the fœtus is dead and the membranes are ruptured, hemorrhage no longer demands attention; but if the fœtus has escaped, and we are in doubt as to whether or not the placenta has been delivered, look over the clots, and should these have been thrown away, make a vaginal examination; if the os internum is yet open the chances are that the placenta is yet in utero. Then, unless there be hemorrhage, wait. In 75 out of 100 cases spontaneous expulsion of the placenta will take place. If there is hemorrhage check it; if the lochia become fetid and brown, extract the placenta while the os internum remains open, by introducing two fingers of the right hand, the left hand upon the abdomen, pushing the uterus down into the cavity. If by these measures we do not succeed, use Levret's forceps, or better still Pajot's curette, with which we are to scrape the anterior surface of the womb; and then employ detergent intra-uterine injections, using preferably a double-barrelled catheter.

Youlin describes a very useful method in cases where the os closes after expulsion of the fœtus; and that is the use of the sponge-tent to re-dilate it and thus permit the introduction of instruments or the fingers. Of course the fingers are always preferable to instruments. Their superiority is so great that in urgent cases we must not hesitate to introduce the whole hand into the vagina, so as to insert the fingers into the womb. Chloroform is useful to prevent the pain experienced, by primiparæ especially, from passage of the hand through the vulva.

[Decomposition of blood and mucus retained in the meshes of sponge occurs so speedily, and the dangers to which the woman whose uterus has been recently emptied would be exposed thereby would be so great, that it is safe to say that sponge-tents should never be employed before, during, or after abortion. Laminaria, or, what is better, tupelo tents, are suitable.

—Ed.]

## TABULAR SYNOPSIS OF THE TREATMENT OF HEMORRHAGE.

BY PROFESSOR PAJOT.

BEFORE LABOR.			
<i>In slight hemorrhages:</i> (A.)	Patient horizontal. Absolute rest. Fresh air. Cool, acidulated drinks. Diet. Bleed, if there are signs of plethora. Empty bladder and rectum.	{	Ergot is here used as a hemostatic; in the case we here suppose there are no uterine pains as yet; hence it is possible that ergot may bring them on, for ergot increases contractions when these have occurred spontaneously, and it seems to be able to provoke them when they have not yet appeared.
	Same treatment as in A, except bleeding. Cold applications first. Then ergot, 2 grm. (gr. xxx.), in three doses, with ten minutes' interval.		
<i>In severe hemorrhages:</i> (B.)	If these do not suffice, tampon; or in certain cases rupture the membranes.	{	{ The tampon first stops hemorrhage; then from retention of blood and its presence it irritates the cervix and induces expulsive contractions. These dilate the orifice; and this will, later on, admit of simple rupture of membranes, ending in delivery.
DURING LABOR.			
<i>In slight hemorrhages:</i>	Orifice not dilated or dilatable.	{ Intact membranes. }	{ Same as A, except bleeding, which is only allowable when plethora is marked.
	With a dilated orifice.	{ Ruptured membranes. }	{ Same.
		{ Intact membranes. }	{ Same as A. Wait, or rupture membranes.
		{ Ruptured membranes. }	{ Same as A. Wait. If pains are feeble and slow give ergot.



This rupture is not followed by any inconvenience. It is a means for preventing further hemorrhage. We may, however, proceed with it and wait till the progress of labor itself stops the flow; after all, the latter proceeding is, perhaps, the wiser. A greater or less tendency to hemorrhage will determine the choice of one or the other of these methods: (1) Wait, if the bleeding does not increase, and all the more so if it diminishes; or (2) rupture the membranes if we note any tendency to increase in the flow. This rupture should be preceded or followed by a dose of ergot if pains are feeble or infrequent. It may be asked whether it be not better to finish delivery in these cases, since all seems tending thereto. We think that when the fetus presents favorably it is best to abstain from all interference, forceps, or version, because their use would be more serious than the slight hemorrhage which they are meant to check.

The case is a very delicate one; the application of a tampon should not be hasty. Indeed, when the vagina is closed blood may accumulate within the womb unless care be taken, and the patient may die without a drop of blood having appeared. The danger is all the greater when the womb is well developed before rupture of the membranes, and when contractions are feeble. Tampon should, then, never be preferred to induced labor, except when the contractions are quite forcible and when (with rupture of the membranes) only a very little water flows from the womb. The application of a tampon must be carefully attended to, and followed by a ventral bandage tight enough to resist enlargement of the uterus. When contractions are feeble, when a large amount of fluid flows on rupturing the membranes, it is better to overcome the resistant orifice and perform version. If the cervix is very thin, sharp, and resisting, incisions should first be made on either side of the orifice.

Here again one may be astonished at the advice: rupture membranes and wait, before doing anything else, until the contractions do or do not stop the flow. Both for mother and child it is so important that the birth of the latter should be the result solely of uterine contractions rather than of often difficult manipulation, that it is very desirable to run the chances of spontaneous parturition every time we can reasonably hope thereto. This cannot be anticipated except when contractions are neither feeble nor infrequent.

{ Orifice not dilated.—Same as D.

{ Orifice dilated. { Version, tearing off the placenta; or Simpson's (Edinburgh) method. Extract placenta before the fetus.

Compress aorta. Perchloride of iron; brandy; wine; transfusion.

{ Same as A, except bleeding; refrigerants. In the weak and when pains are feeble, ergot. Then rupture the membranes. If the orifice does not admit of version, tampon. (D.)

{ Same as A; then refrigerants; lacter, ergot if the pains are weak and infrequent. In case of loss of power compress womb; tampon; mechanical delivery.

{ Rupture membranes. If this does not do, version, or use the forceps.

{ Version when the head is above the orifice. Forceps if it has reached the pelvis. Simple extraction if the presentation be pelvic.

Severe hemorrhage, with placenta over, or very near the os internum.

AFTER LABOR.—Empty the womb. Ergot, 2-4 grm. (gr. xxx. to 3 j.).

In severe hemorrhages:

DURING LABOR.

Intact membranes.

Orifice not dilated and not dilatable.

Ruptured membranes.

Membranes intact.

Orifice dilated.

Membranes ruptured.

When the abortion is over give the woman the same care as you would after a normal labor.

### *Third Case.*

Called to a woman who has pain and hemorrhage, if we are in doubt, always suppose that an abortion threatens, and that it is one which can be prevented (first case). Finally, as a *résumé* of the treatment :

1. Check hemorrhage. Bleed. Give cold drinks. Rest. With grave hemorrhage no bleeding ; local application of cold, and if necessary tampon. Opiate injections to stop contractions.

2. Membranes ruptured ; foetus dead. Aid abortion ; treat symptoms. If orifice is not dilated, *tampon* ; if it is, *ergot*.

3. Abortion is over, but the placenta is in utero. *Wait*, when there is no hemorrhage ; otherwise check the flow.

If the lochia smell and placenta is retained, try to remove the latter by fingers—the whole hand in the vagina—*ergot* (Cazeaux says he has never had any results from *ergot* in these cases) ; Pajot's curette, or detergent injections.

If the cervix will not admit the fingers or an instrument, dilate it with a tent or an instrument of Tarnier's described later on.

Pajot's curette being made in three sizes, the smallest can enter a slightly dilated cervix.

§ 2.—HEMORRHAGE DURING THE LAST THREE MONTHS AND DURING LABOR.—Three varieties of hemorrhage are recognized, according as it occurs *before*, *during*, or *after* labor.

Among hemorrhages occurring before labor, are those previous to the sixth month, which, under the head of abortion, have just been considered. The others occur after the sixth month and hence follow logically. Along with those that occur during labor they form our present subject ; while post-partum hemorrhages belong to the complications of labor.

Hemorrhage has also been divided into mild, medium, and severe, according to the amount of blood lost ; and also into external and internal, according as the blood flows out of the vagina or fills the uterine cavity. We shall consider the latter when we speak of the complications of labor.

*Causes.*—These are identical with those of abortion : predisposing, accidental, special, and exciting.

Hence we shall only review special causes, which vary according to the time of the hemorrhage.

*Special Causes.*—First comes abnormal implantation of the placenta ; then abrupt retraction of the womb, with a short cord, which induces detachment of the placenta. Rupture of a vessel in, or of the whole cord, or rupture of the uterus or vagina, will cause it.

## ABNORMAL IMPLANTATION OF PLACENTA.

There is nothing in obstetrics, says Velpeau, that demands more coolness and knowledge than this.

In the present state of science we cannot say why the ovum at its arrival in the womb falls into the lower segment, there to be implanted and grow, instead of resting within one of the folds of the hypertrophied uterine mucous membrane near the tubal orifices. Still, the same tendency has been noticed to recur in the same woman. In *La France Médicale* (1864) I recorded a case where it successively occurred in a patient, and other obstetricians have given similar evidence.

The centre of the placenta may be mathematically over that of the os, and then the passage is completely blocked; or the placenta may be inserted in the lower part of the womb at varying distance from the margin of the os internum. The latter are regarded as quite as dangerous as the former. This is true as far as the bleeding is concerned; but in the latter case the manual work of clearing the womb is much more easily performed, and hence we regard the two varieties as very different.

At the close of pregnancy, the uterus developing especially below (Jacquemier), some of the placental attachments are torn and hemorrhage results, although the os internum is closed. These hemorrhages occur again and again, and are checked each time by the formation of a clot. Nevertheless as the uterus and placenta develop they recur, and hence this form is called *unavoidable hemorrhage*. The flow usually appears during the last six weeks, as the following statistics will show:

In 89 cases of abnormal implantation of the placenta, hemorrhage occurred—

Before the sixth month in 3 cases.

Between the sixth and seventh months in 6 cases.

During the seventh month in 19 cases.

From the seventh to the eighth month in 19 cases.

In the ninth month in 43 cases.

During the last fortnight of pregnancy and during labor the disappearance of the cervix either augments the flow or induces it if it has not yet occurred—witness the 43 cases in the above statistics. In rare instances abnormal situations of the placenta have not induced hemorrhage. We have no explanation for this.

*Abrupt Retraction of the Uterus and Shortness of the Cord.*—Abrupt retraction of the womb often breaks the cellulo-vascular attachments of the placenta, and when this occurs at a time when labor is not far advanced hemorrhage results. Similarly a short cord will, during labor, pull the placenta and induce premature detachment. Abrupt retraction of the womb occurs with dropsy of the amnion or twin pregnancy, when the uterus too rapidly rids itself of the fluid or one of the children.

*Rupture of the Whole Cord or One of its Vessels.*—This may result from disease of the walls of the vessels, rupture of the varices that sometimes form, or from a very short and non-resisting cord. These alone cause extravasation of blood within the amniotic cavity.

This hemorrhage, though rare, cannot be denied.

*Rupture of the Uterus and Vagina.*—We shall consider these in the chapter on “Dystocia,” although the former may occur during pregnancy from disease of the uterus. We shall only say that rupture of the womb or of varicose vessels in the vagina induces hemorrhage from the external genitals.

*Symptoms and Diagnosis.*—We must distinguish between external and internal hemorrhage, and discover the cause, so as to determine prognosis and treatment as well as diagnosis.

*External Hemorrhage.*—A woman six months pregnant, or one in labor, should never lose any considerable amount of blood; for women never menstruate in the last three months of pregnancy, since ovulation is suspended. Hence any flow of blood from the genitals will be an external hemorrhage (varying in quantity) arising from abnormal implantation of the placenta with coincident development of the womb.

At the end of labor there comes a flow of blood, but this is physiological.

*Internal Hemorrhage.*—As long as the uterine cavity is filled by the entire ovum this hemorrhage is not dangerous to the mother, but it may kill the child. It is rendered dangerous by its difficulty of immediate recognition. But if it is abundant it soon detaches the membranes and becomes external hemorrhage. It has made a cup-shaped excavation in the ovum and induced death of the mother. After rupture of the membranes internal hemorrhage is dangerous, since there is room for a large amount of blood within the cavity of the ovum.

We have said that blood extravasated in the placental tissue disturbs the functions of that organ and induces fetal asphyxia. (*See Placental Apoplexy.*) Hemorrhage between the placenta and the womb produces identical results.

How shall we recognize internal or concealed hemorrhage? Unfortunately we can often only suspect it. But pain within the pelvis, rapid increase in the size of the belly, and the irregular nodules felt upon the womb will confirm suspicion that rupture of the membranes changes to a certainty.

The constitutional symptoms of the mother will also warn us of the danger: the state of the pulse, the pallor of the mucous membranes, the coldness, all will be marked, and convulsions may close the scene.

*Symptoms of Abnormal Implantation.*—When during the last three months, and especially the last six weeks of pregnancy, blood flows during the night, or during perfect rest without appreciable cause, and especially if this flow occurs three or four times, and at irregular intervals, without



having been preceded by any pain, it is safe to assume that we have to deal with a case of abnormal insertion of the placenta. (Pajot's *repeated hemorrhages*.)

Touch discovers an unusual thickness and great development of the lower segment of the uterus, and at no period of pregnancy can we obtain ballottement unless the placenta is bi-lobar or inserted at the margin of the os. The height of the foetus, compared with the time of pregnancy, is another sign to be taken into account. Usually after four or five hemorrhages labor begins, and the woman is prematurely delivered.

If the os has commenced to dilate, and there is a central implantation of the placenta, the finger feels a corrugated surface damming up the os internum—the placenta.

Sometimes we can only feel the thick and soft membranes, and the finger sweeps the periphery of the cervix above the os internum without meeting the placenta, which is a little higher up. Finally, the clot which has checked the hemorrhage plugs the cervico-uterine orifice, and is recognizable by its non-resistance, mobility, and friability. When the flow ceases we had better not examine further, for detachment of the clot may renew the flow.

After delivery it is easy to establish the diagnosis from inspection of placenta and membranes. Usually rupture of the membranes occurs at a point opposite the placenta, but in this case they rupture near the placenta, *i.e.*, at a level with the cervix, through which the child is to pass.

*Prognosis.*—This is not good, because of the large amount of blood that is lost either in one gush or from numerous small hemorrhages. The danger is in proportion to the condition of the woman more than to the quantity of blood lost; in some the loss of six ounces of blood will be followed by worse results than the loss of one and a half pound in others. Generally speaking, the earlier the flow occurs the greater the danger indicated by it. The earlier in labor it occurs, the more guarded must be our prognosis; for—the chief means of treatment being to empty the womb—this is difficult of execution when pregnancy or labor is not advanced and the cervix still remains closed.

Again, insertion in the lower segment of the uterus predisposes to malpresentation. In 90 cases of abnormal implantation the shoulder presented 21 times; whereas the shoulder usually presents but once out of 250 cases. Hemorrhages of the last three months are the most dangerous of all; in 380 cases 133 died. Besides, hemorrhage predisposes the mother to puerperal diseases.

The proportion of deaths for the child is still greater, but hemorrhage does not kill it unless the placenta is torn. The child is asphyxiated, blue, and cyanotic; while if the placenta has been perforated the child will be pale.

## TREATMENT OF HEMORRHAGE OCCURRING IN THE LAST THREE MONTHS.

*Slight Hemorrhage.*—Supine position in bed. Hard pad under buttocks. Thin covering only over pelvis. Chest and feet well wrapped up. Empty bladder and rectum. Cold compresses over vulva. Cold, acidulated drinks. Fresh air in the room. Bleed in the plethoric.

*Severe Hemorrhage.*—First Stage (before labor). Same as above, except bleeding. Ergot if there are no contractions, 2 grm. (gr. xxx.) in quarter-gramme (gr. iv.) doses every ten minutes, or, what is preferable, ergotin as a hæmostatic. If the flow continues, tampon; though this invariably leads to delivery, yet it saves the mother, for she would have to undergo greater loss of blood, especially during labor, and for this she is unfitted.

Second Stage (during labor). Labor has been going on for some hours, the cervix is as large as a twenty-cent silver piece, the membranes are intact, and the presentation is favorable. In the eighteenth century they would have forced the delivery, but Puzos proves that we must excite uterine contraction by rubbing the cervix or rupturing the membranes. Bandelocque believes in the old method, while Dubois follows Puzos, substituting, however, 1 to 2 grm. of ergot (gr. xv. to gr. xxx.) in place of friction over the cervix. He does not rupture the membranes until contractions are well established.

Third Stage (end of labor). The orifice being completely dilated, if the membranes are intact rupture them. If hemorrhage continues give ergot; if the head is still in the superior strait use version; if it has escaped from the cervix apply the forceps.

*Remarks.*—If at the beginning of labor the membranes are ruptured and the hemorrhage is severe, do not tampon, for external hemorrhage may be changed into the internal variety. If the os is rigid, employ friction with extract of belladonna. Make multiple incisions or deliver forcefully. If the tampon be necessary to check the flow, compress the uterus with graduated compresses and a tight body bandage; and give a small dose of ergot, one-fourth of a gramme (gr. iv.).

[The tampon which most effectually checks hemorrhage, and at the same time promotes cervical dilatation, is the Barnes dilator.—ED.]

*Profuse Hemorrhage, with Recognized Abnormal Implantation.*—Tampon, with or without perchloride of iron (the latter may induce sloughing). After a time—eight to twelve hours—the orifice being dilated, withdraw the tampon. If the hemorrhage recurs, instead of putting in the tampon again follow Puzos' plan, viz., pass a sound between the membranes and the uterus and evacuate the liquor amnii. The subsequent retraction of the womb may check the flow, but if not we must (1) perforate the placenta to perform version through its opening (Gendrin); or (2) enter the womb at the place where detachment has occurred, or detach the placenta at the most convenient spot, so as to reach the feet.

If the child is alive the heart-sounds will closely indicate its position. It may happen, and this I have seen, that the placenta was so inserted that the part of the placenta to be detached was greater toward the feet than toward the head of the fœtus. Then it is best to detach the placenta near the head, and apply the forceps in the superior strait according to Hatin's plan. In this way we almost always save the child.

Science records cases where the placenta has been expelled before the fœtus (*placenta prævia*). I saw a case of this kind with Josias, Sr., and the late Ramon (à Charenton); and what is stranger still, the placenta was expelled without hemorrhage. Version ended this labor. It is needless to say that it was a very difficult one. Simpson has therefore proposed, in cases of central implantation, to extract the placenta first of all, uterine retraction then checking the flow. This is undoubtedly more advantageous for the mother than Cæsarean section, but the child invariably dies. Bailly has a method which he says always saves the mother; he has had many successes with it. This is the application of a tampon which has been crowded down firmly into, and hermetically seals, the vagina, being held in position by a stout T-bandage. The bladder and rectum are first to be emptied. This tampon can only be used when one of the fœtal extremities presents, and when labor is fully established. It acts as an obstruction in the highest sense of the word, and completely stops the bleeding.

When allowed to remain, this tampon increases the force of the contractions, which now begin to fully dilate the os, and, along with the abdominal muscles, to expel tampon, placenta, and fœtus. The latter is always or nearly always dead. Besides the above rules we should always obey the general law to perform version when the condition of the cervix allows.

A final remark: As abnormal implantation predisposes to trunk presentations, the expectant plan is not to be adopted subsequent to the application of the tampon; but if labor occurs prematurely (seventh month, for instance) and admits the possibility of a slightly developed fœtus undergoing spontaneous evolution, then we can have recourse to Bailly's plan, although for my part I prefer manual evacuation of the womb.

[In *placenta prævia*, it having been decided to induce labor, the treatment has, for a first object, the securing of cervical dilatation with a minimum loss of blood. The second purpose of obstetrical interference is the extraction of the child, with a continued effort at the prevention of hemorrhage.

In the vast majority of cases, from the beginning of the process of delivery to its termination, artificial measures are called for. Natural processes must be ignored throughout.

In the cases narrated, the early part of the treatment consisted in the use of Barnes' dilators; and, in the light of my experience, there can be no better method employed. They have an advantage over other means,



in that they accomplish dilatation within a brief period of time. During dilatation by their aid it is impossible for hemorrhage to take place.

If the ordinary vaginal tampon or the colpeurynter be used, dilatation of the os occurs from uterine action chiefly, which is stimulated by the presence of the irritating material composing the tampon, or by blood which is retained by it in the cervix and upper vagina.

The dilators of Barnes operate mechanically upon the bleeding cervical region, and unerringly, rapidly, and safely effect a satisfactory dilatation of the cervix.

The dilatation brought about by an ordinary vaginal tampon must require, in many cases, a period of time which necessitates its repeated removal and replacement. During this interchange hemorrhage occurs.

On the other hand, when a Barnes bag is replaced by the next in size hemorrhage does not occur, for the reason that the dilator has acted as a cervical tampon, and the middle of the bag being grasped by the cervix, and its upper end being flattened by the resistance of the placenta, a lateral expansion of the upper compartment occurs, which separates the placenta from its attachment for a little distance beyond the margin of the internal os. Little or no hemorrhage ensues upon the removal of the bag, therefore, for it has accomplished the same end as that gained by the plan of Barnes, which brings about a like partial placental detachment by the finger.

When dilatation is brought about by the dilators the attendant will be present, necessarily, during the entire process of delivery. If he employs vaginal tamponing, it cannot be expected of him to remain constantly throughout the period of dilatation, which may occupy hours or days. If he intelligently and perfectly applies the vaginal plug, it would indeed be safe for him to absent himself from the case, to return only at such times as a renewal of the tampon would be demanded. The inexperienced or careless physician, however, often fails to properly apply the tampon, and it is quite possible, and has more than once happened, that straining or other voluntary effort on the part of the woman dislodges the plug, and, in the absence of the attendant, dangerous and even fatal hemorrhage may occur.

Another point to be considered is the danger of septic poisoning, to which the subject of unavoidable hemorrhage is exposed. This danger is increased in this class of cases because of the lowness of the placental site and the consequent facility with which germs of disease can be brought to it.

The smooth, non-absorbent rubber bag, applied for a short time, must be far more safe than any porous, absorbing material which entangles blood and vaginal secretions in its meshes, and is often retained long after decomposition has commenced. The application and replacement of the latter, too, add to the danger by requiring no inconsiderable manipulative treatment.

Having, as I hope, indicated the advantages attending the employment



of the water-bags of Barnes in the stage of dilatation, I wish to call attention to one further fact in the management of placenta prævia.

Most authors, in treating of the best method for the extraction of the child, have in mind the case of labor coming on spontaneously either before or at full term. I would call attention to a difference between the condition present under those circumstances and that when labor is induced.

In an instance of the latter kind, during the artificial dilatation of the cervix, contractions of the uterus are evoked, and by the end of the first stage of labor the uterus is acting regularly, but *not* efficiently.

A special reason for the noticeable fact that, when the placenta is prævia, measures producing cervical dilatation do not provoke much uterine action is found in the peculiar condition of the cervix. It is soft, abundantly supplied with blood-vessels and sinuses, but less so with contractile uterine fibre, and offers very slight resistance to any dilating force. The cervix can be dilated so easily and in so short a time that the uterus, through its nervous system, receives but little stimulation to action. There is rarely such dilatability when the cervix is in a normal condition; therefore, when a healthy cervix is expanded artificially some uterine activity is excited during the process.

In placenta prævia, when the first stage is completed, the attendant finds himself called upon to select the method best suited to delivery.

Rupture of membranes to allow the uterus to crowd the head upon the placenta, the forceps, and version are principally thought of, the latter being chiefly favored.

I should feel that, almost without exception, version would be the safest method by which to effect delivery when labor was induced.

The uterine contractions which have been excited artificially are not of that character which is essential to a prompt engagement and descent of the head. They lack expulsive power, and are even of but little assistance to delivery by forceps. The use of the latter instrument is attended by some little difficulty, owing to the care and time necessary, during its application, to an avoidance of the placenta, which lies in or near the cervix, and from the length and thickness of the cervix, not uncommonly present, which offer a certain impediment to delivery.—Ed.]

#### ART. VI.—RESPIRATION.

Respiratory troubles are mechanical and end with pregnancy. Formerly harmful bleeding was practised. A little bleeding may temporarily relieve dyspnœa; but we know that it is our duty not to resort to it until absolutely demanded. Still, great dyspnœa has been followed by dangerous symptoms; and it has even been proposed to deliver prematurely. Great distention of the womb by dropsy of the amnion, twin pregnancy, etc., both causing dyspnœa, will indicate what should be our line of action.

## CHAPTER II.

### INTERCURRENT DISEASES OF PREGNANCY.

UNDER this head are included epidemic diseases, eruptive fevers, and acute sporadic and chronic affections. We shall note their influence on pregnancy, the condition of the mother, and methods for their treatment. The laity believe that pregnancy keeps women safe from many diseases, especially during an epidemic; that it modifies the course of some, and even cures certain diseases that have previously existed in the mother. This notion, formulated by A. Petit, has undergone what all scientific theories have suffered. During half a century physicians have been struggling to tell the masses what they believe to be the truth; and when we prove to them that their so-called "facts" should be replaced by others, we shall still want half a century to root out the error.

This is the case with the "humoral" theories and in our specialty with "milk metastasis," an extensive error and one which is unfortunately still propagated by some ignorant midwives. Returning to epidemic diseases, if a few have spared the pregnant woman yet many attack her quite as fiercely as they do others who are exposed to their infection. Dr. Bouchut gives the following statistics for cholera: Of 52 pregnant women attacked by the disease, 25 aborted. Of these 16 recovered and 9 died (12 suffered only a mild attack).

The remaining 27 continued in pregnancy but only 6 recovered, 21 dying. Indeed, as Charpentier says, because of the temperature changes, high at the onset (acute stage) and low toward the close (algid stage), cholera is peculiarly dangerous. It always compromises the life of the child. According to the same author it may be generally stated that in acute diseases if the temperature rises to 105° F., and a little over, the child must die; and if the temperature becomes greatly subnormal the same result follows.

Influenza, while never fatal, yet frequently causes abortion. (Cazeaux.) The pregnant woman is not exempt from epidemic or sporadic typhoid fever, which especially attacks recently delivered women.

In 17 of Cazeaux's cases not one was fatal; but I have seen typhoid fever cause death.

Eruptive fevers are more dangerous in the pregnant woman than in

any other subjects. All have noticed the ravages of small-pox during pregnancy, which has almost as many victims as there are women attacked. Often, unless abortion occurs, the child is born with the disease. Confluent small-pox nearly always induces abortion, the mother dying in nearly every case. In Serres' 23 cases 22 died. Competent authorities state that the foetus alone may have variola, in intra-uterine life, the mother being exempt from the malady.

Measles and scarlet fever act like variola, but the prognosis is a little more favorable.

The puerperal woman is especially liable to scarlatina and like diseases, which become very dangerous when they complicate this period.

Among acute diseases of the respiratory organs pneumonia stands pre-eminent. Grisolle has made this a special study. On October 24, 1865, I presented a memoir to the Academy with five cases in support of my views, and also incorporated in it a memoir of Dr. Bourgeois, crowned by the Academy in 1861. From these two memoirs, which invalidate Grisolle's statements, we deduce :

1. When pregnancy is complicated with pneumonia the time of pregnancy when the disease occurs is immaterial as to its gravity, which is far less than we have been taught to believe up to to-day (2 deaths in 17, instead of 9 in 10).
2. Abortion before the seventh month is no more certain than premature labor after that month. They are both favorable terminations—one reason for looking again at the mooted question, Should we induce premature labor when pneumonia complicates pregnancy?
3. If abortion occurs during the treatment of pneumonia it is due to the *disease*, not to the treatment.

Hence we must treat pneumonia during pregnancy precisely as at any other time, without losing precious time in "expectant" measures. One woman (Case No. 4 in the above-named memoir) was treated exclusively by tartar emetic in large doses; the pneumonia was double. Fifteen days after recovery she aborted; the child was small but vigorous.

The effects of pleurisy are about the same; a good treatise on this point is yet to be written. Bronchitis, more frequent but less dangerous, only induces abortion when it is severe. Among endemic diseases intermittent fevers often induce abortion from perturbation of the whole system, and particularly of the functions of the uterus. Malignant jaundice occurring in pregnant women often induces this condition, the mother nearly always dying (4 out of 5, Kerkzig; and 20 out of 30, Saint-Vel).

The children do not show a jaundiced tint. A midwife, twenty-eight years old, whom I saw with Drs. Genouville and A. Desprez in 1881, five months pregnant, was attacked with malignant jaundice and died without aborting.

Blot made a report to the Academy in 1864 of a study of Bardinet (of Limoges) on epidemic jaundice during pregnancy. We advise consultation of this report for further knowledge on the subject.

Among chronic diseases we find that pulmonary phthisis, whose progress has long been thought to be checked by pregnancy until after delivery, no longer can claim this privilege on a basis of fact.

In 27 cases (Grisolle and Louis) the progress of phthisis was not modified in the least; and it kept on making rapid strides until delivery gave it a new impetus toward its fatal termination. In 32 cases recorded by Gaulard (1880) there was aggravation of the disease in 25. And in 84 cases where phthisis first appeared during pregnancy the disease was always exacerbated.

In only 7 cases where phthisis existed previous to pregnancy was there a slight amelioration about the time of delivery; this was transient and death resulted soon after.

If, in this terrible malady, labor ends favorably, it is due to the non-resistance of the tissues and the smallness of the child, which is often born with a tendency to the maternal disease.

Syphilis has a most evil influence on pregnancy, often inducing abortion or premature labor and causing feeble health in the child, which may be still-born, or be attacked with specific pemphigus, or again carry the germs of congenital syphilis that will sooner or later kill it.

Fournier regards pregnancy as complicating syphilis by adding to the existing anæmia its own debilitating influence, its tendency to neuralgiæ, nutritive troubles, etc. To combat such symptoms, use mercury fearlessly. To-day we know that death of the fœtus is always due to the progress of the disease, *not* to the mercurial treatment, as some would have us believe.

*Lead-poisoning* often induces abortion. (C. Paul.) In 123 of Paul's cases there were 64 abortions, 4 premature labors, and 5 still-births. Of the 50 living children 10 only survived three years.

Along with the symptoms of lead-poisoning, the *influence of tobacco* on the fœtus must be studied.

According to Kostial, of 506 infants whose parents were workers in tobacco, 181 died from the second to the fourth month, *i.e.*, when the mothers went back to work, and their milk became impregnated with nicotine. Of Jacquemart's 100 cases in a similar class, 45 aborted, 15 died in the first few hours after delivery, and of the 40 survivors those who were suckled by the mother exhibited a mortality in the first year ten-fold greater than those brought up on the bottle.

Ulcers of the cervix are sympathetic affections of pregnancy and should cease with it. When occurring at the end of pregnancy they demand no treatment, and repeated introduction of the speculum and cauterization may induce premature labor.

Ulcers occurring during the early months probably antedated conception. These tend to produce abortion. Unfortunately, apart from anti-syphilitic treatment, when this is indicated, all forms of treatment are useless, even dangerous.



## CHAPTER. III.

### DYSTOCIA, OR DIFFICULT LABOR.

By dystocia (δύς, difficult, and τόκος labor, delivery) is meant any difficulty in parturition, whether maternal, foetal, or due to some fault in the appendages. There are two varieties: (1) simple dystocia and (2) impossibility of delivery.

Dangerous labors belong to the domain of puerperal pathology and not to dystocia, properly so called, unless are embraced under the same title of *difficult and dangerous* labors, both difficult and impossible labors and accidents that imperil the mother's or the child's life. This is what has been done by the classical authors of antiquity.

Chantreuil has made still another division: *dinotochia*. At any rate these conditions arise from either general or local causes. Eclampsia, abortion, and hemorrhage have been studied. We have yet to consider rupture of the uterus and vagina, thrombus, and prolapse of the cord, all of which are best treated in this chapter on dystocia.

#### ART. I.—MATERNAL DYSTOCIA.

Difficult or impossible parturition from causes in the mother arises either from obstruction in the pelvic organs (*static*), or from some abnormality in her *dynamic* condition that hinders expulsion of the product of conception.

Under the head of dystocia we include obstructions in the pelvic organs, deformities of the hard and soft parts, and complicated pregnancies.

In Section 1 we shall consider deformities of the pelvis, in Section 2 uterine, vaginal, and vulvar deformities, and in Section 3 complicated pregnancy.

In Section 4 we shall study faults in the dynamic condition of the mother which render labor difficult or impossible without the intervention of art. We shall consider then (1) weakness or slowness of uterine contraction; (2) excessive energy thereof; (3) rigidity of the cervix; (4) abnormally resistant perineum; (5) deviations in the direction of the womb;

(6) rupture of uterus and vagina; and (7) thrombosis of the vulva. This will complete maternal dystocia.

§ 1. DEFORMED PELVIS.—This term embraces much more than “constricted” or “narrowed” pelvis; for the latter is but one variety of deformed pelvis. Indeed, deformed pelvis includes, independent of constrictions, those pelves that are abnormally large, and which may render labor dangerous by their very amplitude.

P. Dubois and Velpeau thirty-five years ago classified deformities of the pelvis. Pajot has combined a table which shall serve as our model.

Of all deformities, those which alter the dimensions of the straits are commonest. Depaul adds to those whose dimensions are changed those pelves where there are obstructions. The latter comprise bony and fleshy tumors that develop in the pelvis, deviations arising from osteomalacia, etc. Here again the pelvic dimensions are diminished. In all cases the diameters of the two straits and those of the cavity are *abnormal*. We may mention the possibility of shortening of the sacro-cotyloid diameter, noticed first by Velpeau. Fracture of the cotyloid cavity, followed by inward projection of the head of the femur sufficient to produce that diminution, has occurred oftener than is commonly thought. (*Gaz. des Hôp.*, September, 1866, and *France Médic.*, November, 1866, Dr. F. Agudio.)

*Excessive Amplitude.*—At first sight it would seem that such would be beneficial rather than prejudicial to pregnancy and labor; but experience and reason prove the reverse.

Among its consequences have been noticed deviations and displacements of the womb during pregnancy; falling of the womb after precipitate labor; hemorrhage from inertia or from premature detachment of the placenta, prolapsus uteri, rupture of the cord, fall of the child, etc., etc. But as Lachapelle says, all the disadvantages are exaggerated, and to avoid them we have only to put the woman in bed from the beginning of labor (advising her *not* to bear down), sustain the womb, and prevent too rapid expulsion of the foetus.

*Very Small Pelvis.*—We say *very* small, for  $\frac{1}{2}$  or even  $\frac{2}{5}$  of an inch off the diameters will not cause difficulty of parturition if the foetus be of the usual size. It is doubtful if so slight a diminution can be distinguished by the pelvimeter.

Velpeau has thus classified *small pelves*: 1, those *absolutely* small; 2, those *relatively* small.

P. Dubois, recognizing this, has, however, given to each of these two classes a name that more clearly indicates the conditions, viz.: 1, deformed pelvis with a perfect shape; 2, deformed pelvis with abnormal shape of the bones.

Each of these has subdivisions. Thus the first class (absolute smallness or perfect shape) comprises all cases where diminution occurs in equal proportion on all the diameters; for instance, the normal pelvis measures

in the superior strait,  $4\frac{2}{3}$ ,  $4\frac{4}{5}$ , and  $5\frac{3}{10}$  in. respectively, for the antero-posterior, oblique, and transverse diameters. Now a deformed pelvis with perfect shape would for the same diameters measure  $3\frac{2}{3}$ , 4, and  $4\frac{2}{3}$  in. respectively. The same is true for the inferior strait and the cavity of the pelvis.

Such a pelvis (Class 1) is found in two classes of women. This is the subdivision I have mentioned.

1. Toward the polar regions, where the stature is lower than in those who dwell in temperate climes, the pelvis participates in the general reduction, but the foetus is proportioned to the size of the parents, and difficult labor does not occur on this account.

Circumstances are very different in dwarfs dwelling in temperate or torrid climates, for a female dwarf may mate with a man whose stature is above the normal, and *vice versa*; hence the foetus is generally too large for the mother's pelvis, inducing difficult or impossible labor.

2. Deformed pelves with perfect shapes are also found in women of all heights, and where a small pelvis would never be suspected. The pelvis is alone small, the remainder of the skeleton being perfectly normal. The Heidelberg collection contains several such. Tall women sometimes have had pelves whose diameters were proportionally short, but whose general aspect resembled a male pelvis.

In all such cases as have been named labor may be more difficult than in women whose pelves have suffered greater diminution, but in *one diameter only*.

Naegele, Velpeau, and P. Dubois recognize four subdivisions of class No. 2, *i.e.*, relative smallness or with bony deformity.

Each subdivision has varieties:

#### FIRST SUBDIVISION—DEFORMITY FROM ANTERO-POSTERIOR SHORTENING.

This is the commonest deformity of all, and it may occur (A) at the superior strait; (B) at the inferior strait; (C) at the pelvic cavity; or (D) in the direction of the symphysis pubis, thus making four varieties.

A. *Superior Strait*.—This is the most common variety; it is recognized by the more or less marked projection of the sacro-vertebral angle. Sometimes it offers an insuperable obstacle to engagement of the head. Pajot attributes this diminution to a sort of "rocking" of the base of the sacrum forward, and he thinks the function of the sacro-sciatic ligaments is to prevent the sacrum from obeying this rocking motion, which leads to a closure of the superior strait. The inferior strait, however, is sometimes enlarged, as a result of this projection of the sacro-vertebral angle.

B. *Inferior Strait*.—The apex of the coccyx, and hence the narrowest part of the sacrum, are both approximated to the pubic arch. Here the base of the sacrum rocks backward and the superior opening of the pelvis

is enlarged. The action of the sacro-sciatic ligaments has been too powerful.

Sometimes both superior and inferior straits are diminished from exaggerated curvature of the sacrum.

C. *Cavity of the Pelvis*.—Here the curve of the sacrum, instead of being marked, is scarcely noticeable; it resembles the male sacrum, is flat, or even convex. Upon touch we can feel distinct projection of the ridge indicating the line of junction of the first with the second sacral vertebra. I call attention to this fact, for I have seen physicians mistake this for the sacro-vertebral angle itself. The direction of the last lumbar vertebra, back and up, should prevent this mistake. Sédillot states that in cases of double luxation

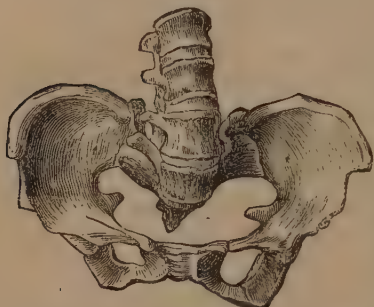


FIG. 61.—Pelvis Deformed in its Antero-Posterior Diameter (rickets).

that point of the sacrum we have just mentioned will correspond to the superior border of the symphysis, and then the distance apart of these two points measures the true antero-posterior diameter.

In this variety (C) may be classed Depaul's "deformed pelvis from obstruction," where soft tumors, cancer of bone, and other causes of obstruction give rise to narrowing of the pelvis.

D. *Symphysis Pubis*.—The deformity of the symphysis is usually due to the obliquity from above down, and from behind forward, whence arises enlargement of the superior strait, but diminution of the coccy-subpubic diameter. The symphysis may also be turned in the opposite direction. These quite frequent deformities, that are often overlooked, coincide in many cases with other deformities and result in erroneous measurements, when digital pelvimetry is practised, on account of the deduction to be made because of the obliquity of the sacro-subpubic line—a deduction that should now be greater than with a normal pelvis. (See *Pelvimetry* and *Pelviography*.)

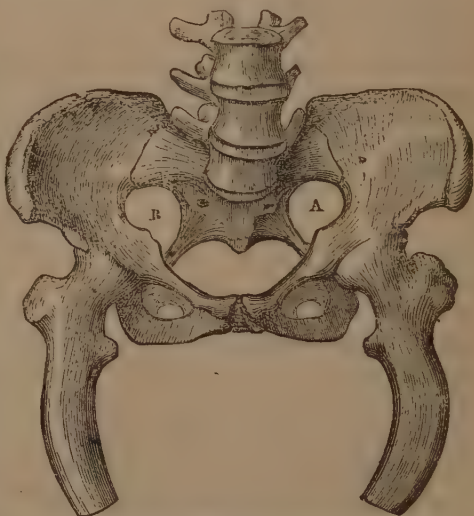


FIG. 62.—Another pelvis similarly Deformed (lordosis).

The "bar pelvis" is due to elongation of the symphysis pubis and de-



formity of the rami and the ischium, which induce changes in the form of the pubic arch, whereby it resembles closely that in the male pelvis. In certain countries there seems to be a predisposition to this; and in any case it may be a serious obstacle to parturition.

Popularly, when a pelvis is narrow or small it is said to be "barred." This is not exact except when used in the sense just described.

#### SECOND SUBDIVISION—DEFORMITIES FROM OBLIQUE COMPRESSION.

These are due to inward projection of the antero-lateral walls of the abdomen, and are not as rare as one might suppose.

They may arise from congenital luxations, an old lameness, or fractures of the acetabulum that occurred in childhood. In Agudio's thesis we notice that in 34 cases of constricted pelvis there were 20 diminished in the oblique direction, apart from causes we have just named and which he also names. In Depaul's collection are pelves with old luxations of the femur; one especially exhibits double luxation and an almost horizontal pubic arch, without having diminished oblique diameters which would obstruct labor. The woman died from causes other than puerperal.

In my prize memoir (Capuron Prize, 1881) I proved that we can reduce deformed pelves from coxo-femoral luxations to three principal types, but that usually (five-ninths of all cases) the influence of luxation—no matter what be the type—was shown by enlargement of the pelvic diameters, and that in double luxations the enlargement might even lead to precipitate labor.

Diminution from oblique shortening may be divided into three varieties, according as one or both obliques are involved, or when one side of the pelvis is atrophied while the other is, or seems to be, abnormally developed. The latter is Naegele's *oblique ovate pelvis*.

*A. Diminution of one Oblique Diameter.*—This is the commonest form. There is internal projection of the quadrilateral surface that forms the deep plane of the acetabulum.

*B. Diminution of both Obliques.*—The same inward projection, but bilateral. It is rare.

In these cases the pubic bones form a kind of gutter internally; they are further away from the sacro-vertebral angle, but the approximation of their horizontal rami is an obstacle to engagement of the fetal head.

*C. Oblique Ovate Pelvis.*—Naegele first described this form. Its characteristics are "(1) complete ankylosis of one of the sacro-iliac synchondroses,

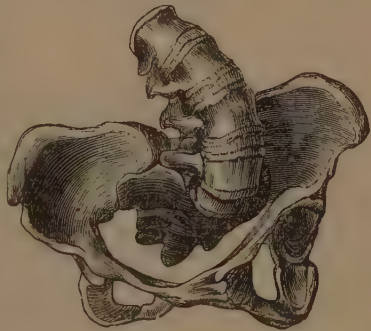


FIG. 63.—Pelvis Deformed in the Left Oblique Diameter (rickets).

*i.e.*, union of the sacrum with one of the ilia (Naegele's pathognomonic sign); (2) arrested or defective development of the lateral half of the sacrum and smallness of the sacral foramina on the side of the ankylosis; (3) smallness of the ilium on that side, and also of the sciatic notches; (4) bending of sacrum to the ankylosed side, and of symphysis pubis toward

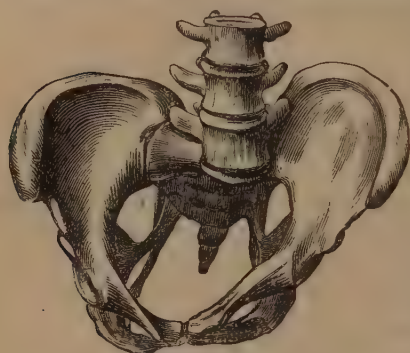


FIG. 64.—Oblique Ovate Pelvis.

the opposite side; hence the pubis no longer faces the sacro-vertebral angle; (5) considerable flattening of the internal surface of the ilium on the side of the ankylosis; (6) that half of the pelvis free from ankylosis shares the abnormal situation and direction of the bones as well as their irregular form; and (7) the pelvis is obliquely narrowed upon the ankylosed side, while on the opposite side it is enlarged in proportion as the obliquity is marked."

Cazeaux was the first to state that the pelves which presented all the characteristics described by the German obstetrician (except ankylosis of one of the sacro-iliac synchondroses) should not be regarded as *oblique ovate*, whence the conclusion that the above-named characteristic is not pathognomonic. Pajot also rejects ankylosis as essential to an oblique ovate pelvis, and in Depaul's collection are several oblique ovates without any ankylosis.

### THIRD SUBDIVISION—DEFORMITIES FROM TRANSVERSE COMPRESSION.

This has two varieties, according as the flattening on one or other of the sides involves the inferior strait or the superior strait with the pelvic cavity.

A. *Diminution of the Inferior Strait Transversely*.—This is the more frequent of the two, and recalls, by the approximation of the tuber ischii, the pelvis of some mammals.

But in animals the shortness of the sacrum, the mobility of the caudal appendage, and the elongated shape of the foetal head allow of normal parturition, and the nearness of the tuber ischii is a normal anatomical condition. Among some species there is at the moment of delivery a physiological separation of the two tuberosities of the ischia, but in the human female the expulsion of the head may be absolutely checked thereby.

B. *Transverse Narrowing of the Superior Strait and Pelvic Cavity*.—This is the rarest anomaly of all, and is often due to flexions of the vertebral column, which deform the pelvis by establishing "compensatory curves." Abnormalities of the lumbar spinal column may induce it, and in this case

one side of the pelvis is less developed than the other, and putting aside the anatomical peculiarities which we have described in connection with

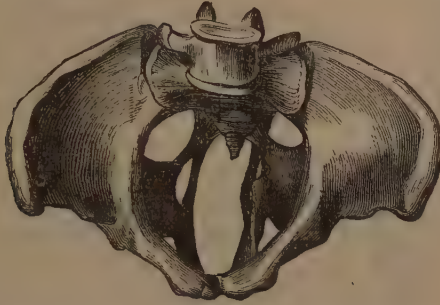


FIG. 65.—Pelvis Deformed in its Transverse Diameter.

the oblique ovate pelvis, and considering only the practical side of the question, we need not separate these two forms one from the other.

#### FOURTH SUBDIVISION—DEFORMITIES FROM COMBINED SHORTENING.

In reading Lachapelle's works we are struck with the multiplicity of the varieties of deformities of the pelvis which she has made, and all of which divisions are without practical utility. Thus it is difficult to make a methodical classification of *kidney-shaped*, *triangular*, *bilobate*, *trilobate*,



FIG. 66.—Pelvis Deformed in Three Diameters (osteomalacia).



FIG. 67.—Pelvis Deformed in Three of its Diameters (rickets).

*round*, *ovate*, *cordiform*, *trapezoidal*, and *pyramidal pelvises*. To obviate this P. Dubois makes a fourth subdivision, embracing all the numerous varieties just mentioned.

Recently G. Chantreuil has called attention to a deformity much studied by the Germans, called "*kyphotic*."

Kyphosis occurring in the lumbar or sacral regions induces retrogression of the sacro-vertebral angle, increase in the antero-posterior diameter



of the superior strait, and from the bending of the ilia upon themselves it diminishes the transverse diameter of the inferior strait, producing a funnel-shaped pelvis.

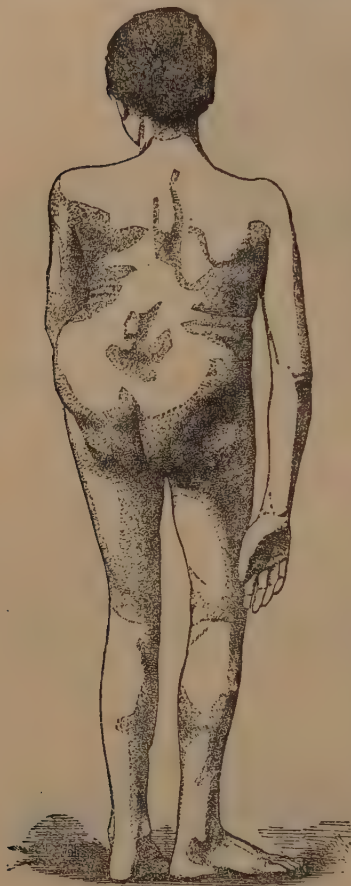


FIG. 68.—Dorso-lumbo-sacral Kyphosis. Primipara (thirty-five years old) normally delivered at term; height four feet. Left ilium nearly 2 in. higher than the right. Pott's disease began in the sixth year; deformities ceased at the fourteenth year. External pelvimetry gave the sacro-pubic diameter as 9 in.; the net measurement being  $4\frac{9}{10}$  in. The axis of the superior strait was nearly horizontal. Before delivery the belly was wallet-shaped. The symphysis pubis was very high. The bis-ischiatic diameter was not measured. The membranes ruptured spontaneously at the beginning of labor. Upon touch the right innominate line was felt. No sign of rickets. Spontaneous labor lasted twenty hours. The child (male) weighed six pounds seven ounces avoirdupois. Its occipito-frontal diameter was  $4\frac{3}{8}$  in.; occipito-mental 5 in.; and the sub-occipito-bregmatic  $3\frac{3}{8}$  in. Eight days after delivery the uterus was so prolapsed that internal pelvimetry was impossible.

Such a deformity of the pelvis nearly always arises from Pott's disease or caries of the vertebræ occurring in childhood. The lower extremities present no abnormalities, and labor is often natural, although at times it is most difficult. In 1872, at my polyclinic, my students witnessed childbirth in the woman figured here. In 1873 I met with another similar case in a woman who had already given birth to two children spontaneously. Pott's disease had occurred at the tenth year, but quite a large dorso-lumbar prominence had not altered the antero-posterior diameter of the superior strait. All those who attended my polyclinic saw this rare case. The height of the woman was not more than three feet nine inches.

I must mention two varieties of deformed pelvis more recently described (France, 1877) by Professor Herrgott (of Nancy): hence a fifth sub-division may be made, viz., deformed pelvis from slipping forward or crushing of the lumbar spinal column. This is *spondelolisthesis*. This was studied by Kilian in 1854; the lumbar column is dislocated into the pelvic cavity; several cases are recorded. Much more rare is *spondylism* (which was first described by Herrgott), resulting from crushing of the bodies of several lumbar or sacral vertebræ, worn away by Pott's disease. The bodies give way and the spinal column falls forward, obstructing the pelvis so that the engagement of any foetal part is impossible. (*Ann. de Gynéc.*, February, 1877.)

*Causes of Deformed Pelvis.*—At present it is impossible to state what causes excessive amplitude of the pelvis, except in those cases where the pelvis shares the



general increase in the size of the skeleton arising in certain races (Aryan), in certain latitudes (Patagonia), in certain conditions of life (savages), or in certain families who are especially well developed. But we shall carefully study the causes inducing deformed pelvis, with diminution in size, especially those with bony deformities; for what we have just said concerning very large pelves equally applies to pelves that are abnormally small, as in dwarfs, Laplanders, etc.

Small pelvis with normal shape may also result from arrested development, so that the pelvis, after puberty, preserves all the characteristics of childhood. These cases are rare and should be ascribed (Nægele) to a freak of nature, just as some people have too large or too small a head in proportion to the rest of the body.

Among causes that predispose to deformity of the bones in youth, rickets stands pre-eminent. Pajot even says that out of 100 pelves that are relatively diminished in size, 95 are rachitic. This proportion, slightly exaggerated perhaps, leaves very little room for the operation of other causes of deformed pelvis. Hence a greater share should be claimed by osteomalacia (which arrests bony development and changes the shape of the adult female pelvis), lordosis, scoliosis, injuries of the lower limbs that have induced youthful lameness, congenital unilateral luxations, etc., etc. We have already referred to kyphosis. Still, rickets is, of all, the commonest cause.

Cazeaux gives as a cause producing changes in the form and dimensions of the pelvis, antecedent deformity or lesion of some other part of the skeleton.

Dr. Campbell examined the pelvis of a woman (who died in labor) who since her fourth year had walked with a crutch, from an injury to the right lower limb. Her pelvis was normal. I have seen—contrary to what Lachapelle states—a woman whose thigh had been amputated in her youth, in whom a perfectly normal delivery occurred. (“Clin. d’Accou,” 1860).

*Diagnosis.*—Pajot, instead of following the classical authors in dividing the symptoms of deformed pelvis into *rational* and *physical*, considers the diagnosis in three different aspects.

1. He supposes a young girl to marry for the first time; she is deformed and her anxious parents come to the physician for advice.

The latter must learn all about her infancy, when she began to walk, whether she has been rickety, and whether after having commenced to walk she did not suddenly stop. How long did she cease walking? Did she afterward use crutches? All these questions clear the diagnosis. It is the same, too, *à propos* of weaning, the time when she commenced eating adult’s food, and the time when the teeth appeared. Find out also whether her nurse was a country woman or whether the mother suckled her child. Find out the mother’s social position.

## CLASSIFICATION OF ABNORMAL CONFORMATIONS OF THE FEMALE PELVIS.

*With special reference to Parturition, according to the Works of Naegele, P. Dubois, Velpeau, Danyau, Cazeaux, etc.*

BY PROFESSOR PAJOT.

## ABNORMALITIES OF THE FEMALE PELVIS.

<p><i>From narrowing, or diminution.</i> Very important.</p>	<p>Complete (Velpeau), or with a perfect shape.</p>	<p>In women of all heights.—Narrowing is never suspected; the bones are normal in form, consistence, etc. In dwarfs.—The bones have all the characteristics of early youth.</p>	<p>EVERY DIAMETER DIMINISHED.</p>
	<p>From antero-posterior compression. Flattening from before backward. (P. Dubois.) The commonest deformity.</p>	<p>Four varieties :</p>	<ol style="list-style-type: none"> <li>1. Superior strait alone compressed; projection of sacro-vertebral angle. Cavity and inferior strait normal or even larger than normal.</li> <li>2. Sacrum flat or even convex; projects forward. Superior strait and cavity narrowed.</li> <li>3. Sacro-vertebral angle projects in front. Similar projection of the apex of sacrum. Excessively exaggerated curvature of the bone. Superior and inferior straits narrowed. Cavity enlarged.</li> <li>4. Flat symphysis pubis, curving in, or greatly elongated. It may be oblique from without inward.</li> </ol>
<p>Relative (Velpeau), or with deformity of the bones.</p>	<p>From oblique compression. Sinking in of antero-lateral walls. (P. Dubois.) Most common form after the above.</p>		<p>Three varieties :</p>
<p><i>From enlargement.</i> Quite unimportant.</p>	<p>From transverse compression — from one side to the other. (P. Dubois.) The rarest at the superior strait and in the cavity. Quite common in the inferior strait.</p>	<p>Two varieties :</p>	
	<p>From combined compression.</p>		<p>Numerous varieties :</p>
<p>Deviations, displacements of the womb, uterus stays in pelvis during all pregnancy, fall of uterus, precipitate labor with its dangers. MANAGEMENT AND TREATMENT.—Keep the woman in bed from the beginning of pregnancy, hinder all efforts previous to dilatation, sustain the womb, and prevent hasty exit of the foetus.</p>			

## CLASSIFICATION OF ABNORMAL CONFORMATIONS OF THE FEMALE PELVIS.—(Continued.)

## CAUSES.

Softening of bones. Rickets. Osteomalacia. Previous deviation or change in another part of the skeleton. Arrested development.

## DIAGNOSIS.

History of patient's infancy. Examination of the patient—her stature (usually short); lower limbs (usually short thighs, curved femurs, and twisted legs); her walk; vertebral column (a twisted spine does not necessarily imply a deformed pelvis); size of head, etc., etc.

*External mensuration of pelvis* with Baudelocque's compass. In a well-formed pelvis, from the summit of the symphysis pubis to the first spinous process of the sacrum is 19 ctm. ( $7\frac{2}{3}$  in.). From one antero-superior spine of the ilium to the other is 24 ctm. ( $9\frac{3}{4}$  in.). From one antero-inferior spine to the other is 21 ctm. ( $8\frac{3}{4}$  in.).

*Internal mensuration* with Boivin's, Van Huevel's, Stein's, or Coutouly's pelvimeter, or better still with the finger. The index-finger is directed toward the sacro-vertebral angle; with the other forefinger mark upon the one in the vagina where the latter reaches the symphysis pubis. Subtract about 1 ctm., i.e.,  $\frac{2}{3}$  in., and we have the antero-posterior diameter.

## PROGNOSIS.

*As to pregnancy*, it predisposes to premature labor. *As to mother and child*, always grave; varying, however, according to (1) the degree of diminution, (2) size of the foetus and the presentation, and (3) the energy of the contractions. A better idea of prognosis is obtained by a study of the treatment.

## MANAGEMENT AND TREATMENT.

A. *When the smallest diameter is at least  $9\frac{1}{2}$  ctm., i.e.,  $3\frac{1}{2}$  in.*—(a.) Vertex. Wait five to six hours after complete dilatation, the head being in the superior strait. When in inferior strait, wait two to three hours. Apply the forceps. (Personally I should say: Wait as long as contractions continue, and as long as the state of mother and child is not imperilled.)

(b.) Face. Try and convert into a vertex presentation—this is usually impossible. Put on forceps without waiting as long as in the case of vertex.

(c.) Breech. Wait; then moderate, well-directed traction upon extremities. Artificial engagement of head by means of forceps or hands.

(d.) Trunk. Try cephalic version, then as in vertex. If not successful, podalic version, then as in breech. Pelvic version always according to Mme. Lachapelle and M. Simpson.

B. *When between  $9\frac{1}{2}$  and 8 ctm. ( $3\frac{1}{2}$  and  $3\frac{1}{8}$  in.)*—If the child is alive wait a few hours after dilatation, then forceps. If not successful, wait two to three hours, then apply a second, then even a third time. Finally, perforate skull; wait; or better, cephalotripsy.

If the child is dead, the latter method is to be chosen. (Induced premature labor at seven and one-half to eight months, especially if previously the woman has not been able to deliver spontaneously or with forceps. P. Dubois always puts in this last condition.)

C. *When between 8 and  $6\frac{1}{2}$  ctm. ( $3\frac{1}{8}$  and  $2\frac{3}{8}$  in.)*—Perforation of skull, cephalotripsy, or symphysiotomy (no longer done), after having waited to see what might be expected from contractions, without imperilling mother's state. (Induced premature labor at seven to eight months, scanty nourishment for the mother. Moreau; Depaul.)

If in these two kinds of narrowed pelvis the foetus presents other than the vertex, try to restore it to the superior strait, and then follow indications.

If one side of the pelvis is larger than the other (oblique, ovate, lateral bending of vertebral column), such a position of the foetus would demand version.

D. *When less than  $2\frac{3}{8}$  in.*—Try embryotomy and apply the cephalotribe. Repeated cephalotripsy without any traction, so long as the instrument can pass. (Pajot.) When less still, Cæsarean section. Induce abortion after consultation with several physicians.

Rickets occur most often in the country among peasants who early cease to suckle their children, and who tie an infant in a little chair with a bar in front—a regular prison—while they themselves go on with their daily money-getting operations. The baby leans over the board to play with the things in front of it and thus its pelvis is deformed. Rickety children cannot walk at the usual time.

Now, proceeding with the general examination of the young woman in question, the physician must observe her height; with rickets this is below the average, as a rule. In the majority of instances the face has peculiar characteristics in this disease; it is somewhat infantile and the eyes are dissimilar. The arms are long and the legs and thighs short, thick, and sometimes exhibit indelible traces of rachitis; the tibial crest is nodose, irregular, and in severe cases the legs are “bowed.” Rickets attacks the lower limbs first, then the pelvis, while the spine is involved last of all. Hence the above-named points are of vastly more importance for diagnosis than gibbosity or lordosis of the spinal column, which may be independent of any change in the pelvic bones. Rickety women have a peculiar gait that somewhat resembles a “duck’s waddle.” We must make them walk before us, and then we may notice a certain shuffling of the feet, a kind of lameness which, in nearly all cases, indicates “hollow-back” and an unusual amount of knock-knee. The head is peculiar. It is abnormally developed, and oftentimes these poor creatures are most intelligent. In some, however, the arrest of development is so great that all the faculties are in abeyance, and they are well-nigh idiots. Their limbs—upper and lower—are greatly deformed; and Bailly states the former have a *fœtal aspect* which cannot fail to be noticed by an experienced observer. The peculiar look of the head referred to has induced Pajot to state that if ten individuals were tied up in a bag, he could tell the hump-back or rickety from all the others by his head alone.

After the general examination a local exploration should be made. But in the case in question *external* pelvimetry alone can be practised.

The family must decide upon *internal* pelvimetry.

2. Pajot here supposes that the young girl is married without having consulted a physician; she is pregnant, but fearing a difficult labor she comes to consult us to find out the true state of affairs.

After having questioned the woman as before, and having examined her height, face, head, limbs, and style of walk, proceed to examine *internally*, since there is no longer any obstacle thereto. If the finger (inserted as subsequently described) does not meet the sacro-vertebral angle, or if the fœtal head is in the pelvis, there is a great chance of labor occurring naturally. At most will an application of the forceps be demanded. But if the diminution be great and the sacro-vertebral angle easily felt, the conduct of the physician must vary with the degree of deformity and the period of pregnancy. (See *Treatment*.)



3. Finally, he supposes the woman in labor. A physician has not been called or consulted. Put the same questions and make the same examinations as above. But *touch* is very difficult to practise here, for the foetal part, even when it has not engaged, is deformed and elongated, and usually forms an obstacle to the introduction of the finger, so that one cannot discover how small the pelvis is. If *very* small, however, no part of the head can engage. This is rare, while the other cases are commonly met with in practice.

*Prognosis.*—This, for both mother and child, is based on the amount of narrowing. We shall see that the prognosis is worse in proportion to the degree of diminution, if we consider vertex (the most favorable) presentations and divide, at the same time, deformed pelvises into three classes, viz., (1) whose *antero-posterior* diameters are between  $4\frac{1}{2}$  in. and  $3\frac{1}{4}$  in., which is the average length of the foetal bi-parietal diameter; (2) between  $3\frac{1}{2}$  in. and  $2\frac{3}{4}$  in., the average of the foetal bi-temporal; and (3) those less than  $2\frac{3}{4}$  in.

In the first labor may occur without intervention, for the foetal bi-parietal diameter is very reducible. In the second we may have spontaneous delivery up to  $3\frac{1}{2}$  in., rare, it is true, when the foetus is at term; while between  $3\frac{1}{2}$  and  $2\frac{3}{4}$  we cannot expect this, except in cases of abortion. As for the third class, labor is impossible without some operation dangerous either to mother or child; and hence the prognosis will vary according to the operation. Several other facts must be known to complete the prognosis; such (for classes 1 and 2) are the size of the foetal head, the reducibility of that head, and the force of uterine contractions. A general rule is, the easier the labor the greater the chances of life for the child. During pregnancy a deformed pelvis predisposes to abortion toward the third or fourth month, when the gravid uterus cannot readily rise above the narrowed superior strait. In a high degree of narrowing the abdomen will be very large during the latter months of pregnancy, from non-engagement of the lower part of the foetus in the pelvis. The womb may contract and premature labor occur.

*Treatment.*—Treatment is to be considered with regard to two distinct epochs: (A) independent of pregnancy; (B) during pregnancy and pending labor.

#### A. Independent of Pregnancy.

In childhood the physician should watch over those circumstances that influence the ossification of the pelvic bones; he should forbid pressure over that region; the nurse's arm, when the child is being carried, may deform the waist; and the same is true of the chair to which reference has been made. Trying to teach children to walk too early predisposes to deformities. It is better to let them lie in the crib until the bones are

sufficiently solid, without depriving them, however, of sunlight and air. (Bouvier.) The deplorable custom of country women making their children eat the food of adults too soon is, above all, a great cause of rickets. Thus milk, given as a medicine for two years (Pajot), exercises a marked curative influence. Later on, cod-liver oil, tonics, and phosphate of lime in an easily assimilated form are the only means at our command, orthopedics and gymnastic exercise being unable to change the form of the pelvis.

When the pelvis is deformed because of osteomalacia, luxation, and other lesions of the lower extremities, surgery is to be consulted.

### B. During Pregnancy and Pending Labor.

To study this properly five sub-classes are made.

1. *The Smallest Diameter of the Pelvis is  $3\frac{1}{2}$  inches.*—The Child Presents the Vertex. Wait and trust to nature. We should begin our watch when the cervix is completely dilated. Then, if the head is arrested in the superior strait, P. Dubois says wait six or eight hours and then put in the forceps. Formerly physicians, with Simpson, performed podalic version, and the young practitioners of to-day seem to wish to renew this. But it is scarcely probable that with this amount of diminution extension of the head is to be feared; still we must not forget that the forceps, in a practised hand, is better for the child, and that there is no urgency for the mother in any case. In these instances Pajot prefers—before applying the forceps—to wait until the condition of the mother and child presents nothing dangerous. It may be that intervention is demanded at once; but oftener this is not needed till quite late. The mother's pulse is the guide in these cases, along with the foetal heart and the presence of meconium in the liquor amnii. If uterine contractions have ceased we must interfere when the cervix is dilated.

If the foetal head has passed the superior strait and is arrested in the pelvis, or by a narrow inferior strait, or from feebleness or want of uterine contraction, we must not wait longer than two or three hours (P. Dubois) before putting in the forceps. All agree on this point; yet some advise the expectant plan, fearful that the head, pressing on the soft parts, will induce gangrene of the tissues and later lead to the formation of fistulæ. [Statistics show that the frequency of fistulæ is in direct relation to the tardy, or lack of use of the forceps.—Ed.]

In Face Presentation. To-day we know that face presentations terminate spontaneously in well-formed pelvises; but when the pelvis is diminished to the size named above, the expectant method is a dangerous one. After waiting half the time recommended for vertex, P. Dubois advises that the hand be introduced and the chin pulled to the sternum so as to convert it into a vertex. Perhaps this is easier done by means of the lever, using the occiput as the fulcrum. In any case these manipulations are difficult

after the waters have been evacuated for any length of time, and the forceps must be applied without hesitation. [Only, however, after failure of some such attempt.—ED.]

The difficulty of applying them in certain face presentations makes us prefer podalic version, as Simpson advises, when the head is movable above the superior strait.

**In Breech Presentation.** Wait to see what uterine contractions will do. If the expulsion of the child is hindered, we must make moderate traction in the direction of the axes at the time of contractions (when these are present), and deliver the trunk. Then artificial rotation and delivery of the head with hands or forceps. (See *Version*.)

**In Shoulder Presentation.** Version is advised, or rather cephalic reduction, which supports the statements of Flamant, Mattéi, and Pinard. This operation still leaves us to the possible necessity of putting on the forceps. After rupture of the bag of waters cephalic version is difficult, and podalic version is preferable. Lachapelle and Simpson perform it in the first place. (Joulin.)

2. When  $3\frac{3}{8}$  and  $3\frac{1}{2}$  inches are respectively the Largest and Smallest Diameters.—Two sub-classes are to be made, according as the child is alive or dead.

**When the Child Lives.** Wait several hours after dilatation if the mother's condition allows, and first make a fair trial of the forceps. If unsuccessful, try no more; do not make a compressor out of the instrument. Unlock and two hours later try again; a third attempt is sometimes made two hours after the second. But if after two or three applications the head does not engage, give up the idea of bringing forth a living fœtus. Perforate the cranium so as to put the mother out of agony and danger. Then engagement may occur of itself, or after application of the forceps, which facilitates the evacuation of the cerebral matter without resorting to intracranial injections, as has been recommended; and if the base of the cranium still obstructs, use the cephalotribe. It is clear that in case of arrest of the uterine contractions we must interfere when the dilatation is complete. The same is true when the fœtus passes meconium or when the heart-sounds become irregular.

In such cases Depaul prefers the forceps with strong and continued tractions—made by two individuals who together pull in the direction of the axis of the superior strait—to end labor in a single séance. (Bailly, 1866.)

Still we must know when to stop, for a pelvis may rupture, suppuration in its articulations may follow, and death be induced. (Godefroy de Rennes, *Revue Méd. Chir.*, 1873.)

If no advance is made cease pulling, put the woman back in bed, and wait for uterine contractions, which, acting upon a head that is slightly engaged, will facilitate a second and perhaps a successful application two or three hours later.

Depaul's method certainly preserves the lives of many children, but it may cause dangerous inflammations in the mother. As for the living children, the compression most of them have undergone renders them unfit for extra-uterine life, if indeed grave lesions do not already exist at birth, as stretching of the optic nerve and projection of the eyeball from out its socket. (Bailly's thesis.)

Tractions may, with the aid of special instruments, have at least the advantage of being regulated by the dynamometer. It is solely in this way that force can be at all employed in obstetrics.

Dead Child. Now we may quickly decide in favor of perforation of the skull and cephalotripsy, for we have the mother's interest alone to consult.

If the physician is warned in time and he has made out the extent of deformity of the pelvis, he is authorized to induce artificial labor at the eighth month of pregnancy.

Since spontaneous labor or delivery by forceps is not so very rare in pelves measuring  $3\frac{1}{2}$  in. in their smallest diameter, P. Dubois demands that premature labor should be induced in multiparæ only, even when previous pregnancy required embryotomy. To-day, when the methods of premature delivery are almost perfect, this operation is nearly as harmless as natural labor. Hence we may employ it at the onset, for the possibility of spontaneous delivery at full term may also be adduced in the case of multiparæ, and thus would be stricken from practice an operation that renders the greatest service, and which is better for the child's life at the eighth month than at the seventh, in spite of the prevailing opinion with the laity. Pajot believes that primiparæ are more liable to puerperal diseases after use of the forceps, and hence prefers premature labor. In pelves of the size now being considered Depaul's *depleting* treatment may be employed. It seems to have been successful in his hands, and experiments made at Alfort seem to speak in favor of it. It consists in repeated bleeding during pregnancy, purgation, and a sparse diet even when the woman has need to sustain her strength. This, says Pajot, is barbarous treatment, a torture of Tantalus extending over nine months, and which should be rejected as more harmful to the child than labor induced at the eighth month, and which is still more harmful to the mother, to preserve whose life and strength is the chief aim of every physician who devotes himself to the practice of obstetrics.

3. *When  $3\frac{1}{2}$  and  $2\frac{3}{4}$  inches are the Largest and Smallest Diameters of the Pelvis.*—In this case spontaneous delivery is almost unheard of, and always presupposes an abortion. Besides, we know that deformed pelvis predisposes to premature labor. (P. Dubois.)

Hence, having waited for what we can expect from uterine contractions, without compromising the mother's condition, perforate the cranium and perform cephalotripsy. Clinical experience shows that the fœtus is usually



dead before the mother's condition is dangerous. Symphyseotomy is to-day an obsolete operation.

For conscience' sake the physician, before performing embryotomy, should try the forceps whenever the pelvis measures 3 in. Pajot has never seen the instrument successful when the limits were as small as here given, for we cannot call it a success when the child lives but is seriously injured from compression of the forceps, or sacro-vertebral angle; injured so that death nearly always follows, and which is attended with so much exhaustion to the mother that her life is endangered or her health very much broken.

If warned in time we may induce premature labor at the seventh or eighth month, according to the smallness of the pelvis.

Various Presentations. In breech, wait; and in transverse, try external (cephalic) version. If unsuccessful, delivery by the feet is the sole means of ending the case. Deliver the arms artificially, and have a practiced assistant to push (through the woman's abdominal walls) the foetal head down in the direction of the pelvic canal, according to the rules given by Champetier de Ribes. (See farther on, art. "Version.") If, despite this, the head is extended and it cannot be delivered, decapitate, then perforate the head, to which the cephalotribe is applied.

Oblique Ovate Pelves. When one side of the pelvis is larger than the other, presentations (other than the head) demand pelvic version, care being taken to use the largest portion of the pelvis for engagement of the foetal head. Version may be practised in certain positions of the head.

4. *When  $2\frac{3}{4}$  and 2 inches are the Largest and Smallest Diameters.*—Here it is that obstetricians disagree. Cæsarean section is advised as soon as labor begins, and we must say this is best for the life of the child. But this is so dangerous for the mother that, apart from country practice (where the Cæsarean section has been very successful), I follow the opinions of those who advocate embryotomy, however dreadful this may seem for a living foetus.

Especially in these cases does Pajot recommend his method of repeated cephalotripsy without traction, to which we shall refer when speaking of operations. Omission of the traction frees cephalotripsy of much of its traumatic character. The lowest limit that would allow of embryotomy is 2 in. Once, the application of the forceps-saw in a pelvis measuring  $1\frac{1}{8}$  in. was followed by death; and the cephalotribe once caused death of the mother when applied in a 36 mm. ( $1\frac{1}{2}$  in.) pelvis. The author of "repeated cephalotripsy without traction" recognizes no limit except the impossibility of entering the instrument, and to limit the operation he has made a cephalotribe whose blades are only  $1\frac{1}{8}$  in. thick. But the operator will be forced to crush the trunk into pieces after reduction of the head, for in those cases the exit of the foetus is impossible through the normal channels. It is in these cases (when we learn that pregnancy has

occurred during its early months) that we may consult with fellow-physicians concerning induced abortion. This question, which has long been contended by physicians and lawyers, is to-day decided in favor of the mother, *i.e.*, in the affirmative, since it spares her a dangerous operation, and does not in the least modify the child's condition.

5. *When the Pelvis measures less than 2 inches.*—These cases are rare. There is one in the Heidelberg museum which measures only 2 ctm. ( $\frac{4}{5}$  in.) from the sacro-vertebral angle to the symphysis. There are several in the Dupuytren museum, and one measured only a few millimetres (1 mm. equals  $\frac{1}{25}$  in.) in the sacro-pubic diameter. All such demanded the Cæsarean section if an abortion had not been induced before the foetus became viable. But Porro's modifications of this operation render it less dangerous to the mother.

[We would call attention here to *laparo-elytotomy*, or the Thomas operation, as an operation worthy of consideration in every case in which there is pelvic deformity sufficient to suggest the propriety of Cæsarean section, or in some instances even of embryotomy.—Ed.]

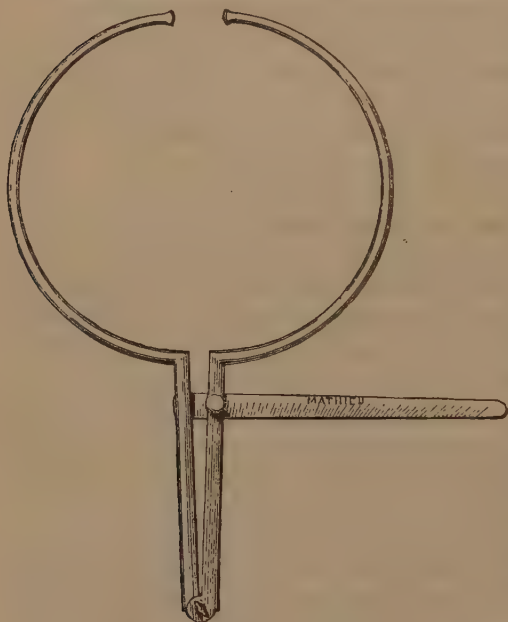


FIG. 69.—Baudelocque's Pelvimeter.

§ 2. PELVIMETRY AND PELVIGRAPHY.—Pelvimetry is the art of measuring the pelvis; the instruments therefore are called pelvimeters. There is a great number of them (*vide* "Tarnier's Atlas," Sée, and Lenoir), being spoken of as external, internal, or universal, *i.e.*, useful in either of the first two instances.

Among external pelvimeters Baudelocque's deep

compass is the only one preserved; it also measures the diameters of the head of the new-born.

*External Pelvimetry.*—Before describing external pelvimetry two important points claim attention.

1. The average thickness of the base of the sacrum is  $2\frac{3}{8}$  in.
2. The symphysis pubis is  $\frac{3}{8}$  in. thick.

These two measurements should be subtracted from the measurements given by external pelvimetry. If we wish to know the length of the sacro-

pubic diameter, one tip of the pelvimeter should be placed upon the upper portion of the symphysis pubis (the woman lying upon her side), and the other upon the spinous process of the first sacral vertebra; or, in case the woman is stout and this second landmark cannot be readily made out, put the tip  $\frac{2}{3}$  in. underneath the spinous process of the last lumbar vertebra.

We then find marked upon the graduated scale 19 ctm., i.e.,  $7\frac{3}{4}$  in. (representing the distance apart of the two tips), if the pelvis is well formed. Deducting  $3\frac{1}{2}$  in. for the thickness of the bones ( $2\frac{3}{4}$  for the sacrum and  $\frac{3}{4}$  for the symphysis) we have  $4\frac{1}{2}$  in. left, the normal length of the antero-posterior or sacro-pubic diameter.

The difficulty in finding the above-named measuring points leads. Depaul to propose prolonging the line of direction of the iliac lumbar ligament to the median line, and to let fall upon this point a perpendicular  $\frac{4}{5}$  to  $1\frac{1}{2}$  in. long, which will abut upon the spinous tubercle of the fifth lumbar vertebra.

Despite all the means employed, the varying thickness of the bones and soft parts, and the possibility of obstructions within the pelvis, lead us to prefer internal pelvimetry.

*Internal Pelvimetry.*—Internal pelvimeters are numerous, but they are difficult to apply, and the indications therefore cannot be relied upon. Such are the pelvimeters of Stein, Coutouly, and others. Besides, they cannot be thought of in the cases of young girls; and whenever they can be used with certitude they can be better replaced by the finger—digital pelvimetry.

*Digital pelvimetry* is practised with the index finger. Some obstetricians use also the middle finger because it is longer. This can only be done, however, to measure the normal pelvis, since the fingers cannot measure beyond 85 mm. ( $3\frac{3}{4}$  in.). But if the pelvis be narrowed to the slightest degree, digital pelvimetry obtains sufficiently exact measurement of the sacro-pubic diameter. At the same time it is able to recognize diminution in the oblique diameters, irregular conditions of the pelvic cavity and of the inferior strait, which as a general rule coincides with a deformed superior strait.

However this may be, to measure a diminution of the pelvis by means of the finger, the index finger of the right hand must be introduced deep within the vagina, in the direction of the sacro-vertebral angle, which it will touch. Then with the other hand mark upon this right index finger the point corresponding to the internal surface of the pubis—the summit of the arch indicating the length to which the finger was introduced—and then measuring the latter with a rule, we obtain the sacro-pubic diameter. But this, the “diagonal conjugate,” is not exactly what we want to find; hence the disadvantage of this method. Indeed, it is impossible, especially with deformed pelvises, to exactly appreciate the difference between the sacro-subpubic diameter and the minimum sacro-pubic diameter, the latter’s measurement being the all-important one.

The sacro-subpubic diameter will be the hypotenuse of a right-angled triangle, one of the sides adjoining the right angle being desired; but the inclination and the length of the symphysis pubes are very variable, so that the problem lacks mathematical exactness. But since we always have the possibility of knowing the height of the symphysis, which varies with the individual (especially in the so-called "barred" pelves), we can mathematically determine the desired measurement, having in the height of the symphysis one side of the triangle, the sacro-subpubic giving us the measure for the other.

This exactness we do not use in obstetrics; besides, as already stated, the useful diameter is not one side of the right angle, but the sacro-pubic diameter represented by a line passing from the sacro-vertebral angle to the most projecting portion of the posterior surface of the symphysis pubis, which is generally a little closer to the upper than to the lower portion of that symphysis.

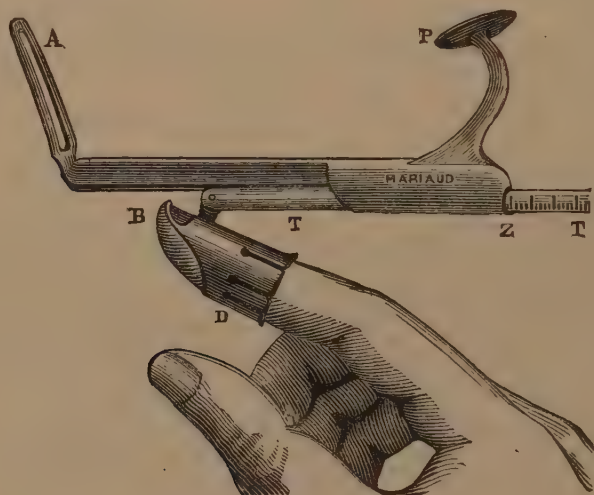


FIG. 70.—Crouzat's Pelvimeter.

Hence we may deduct  $\frac{3}{8}$  in. from the measurement obtained. Thus, should we obtain  $3\frac{1}{4}$  in. as the sacro-subpubic, we can safely state that the minimum sacro-pubic diameter is about  $2\frac{3}{4}$  in. The fingers may also measure for us the diameters of the inferior strait. There is no need to explain this further.

To obtain as exact results as are possible, and to do away with this approximate deduction, which is a frequent cause of error, Dr. E. Crouzat has made an internal pelvimeter with which we can work as in digital pelvimetry, except that the length of the required diameter is obtained directly by the instrument; hence our young confrère calls this *direct pelvimetry*. We present a drawing of the instrument (Fig. 70) which shows its mechanism.



For further details read what I have said on page 427 of *Méd. Pract.*, 1882. I may add that I have experimented upon the living female, comparing the result with digital pelvimetry, and that in two instances the instrument has given me identical measurements, differing only  $\frac{1}{2}$  of an inch from what I obtained by digital pelvimetry, deducting the hypothetical  $\frac{3}{8}$  of an inch. (Same journal, page 605, etc.)

Pinard proposes a method of pelvigraphy which is free from the disadvantages of pelvimetry.

Unfortunately his method is only applicable to four kinds of pelves, to which may be added the normal pelvis, viz., rachitic pelves whose sacrum is not laterally bent, small pelves with perfect shapes, kyphotic and coxalgic pelves.

*Pelvigraphy.*—Take two metallic flexible bars,  $\frac{3}{8}$  in. wide and of unequal length.

“To obtain the contour of the anterior surface of the posterior wall of the pelvis,” says Pinard, “place one end of the larger branch upon the tip of the coccyx and move it along the median line up to the second or third lumbar vertebra, pressing it enough to force it to adapt itself perfectly to every irregular bony process. Taken from the pelvis, this arm preserves the impress of each projection and depression of the median line. Placed upon a piece of paper, its contour may be traced by a pencil, and thus we obtain an exact trace of the posterior surface of the pelvis.

“To obtain the tracing of the symphysis we begin by determining the landmarks upon the paper on which is our first tracing. Begin by describing with a compass an arc of a circle having as its centre the vertex of the angle represented by the promontory, the radius being the length of the sacro-subpubic diameter measured by the compass itself. The superior border of the symphysis will naturally be found at a point upon this curved line. To determine it exactly, describe a second arc whose centre is the point of the compass and whose radius the length of the coccy-subpubic diameter. The point of intersection of these two arcs will be the superior border of the symphysis.

“To obtain the lower border draw again two arcs of a circle, one having the promontory as its centre and the sacro-subpubic diameter for its radius, the other having the coccyx for a centre, the radius being the coccy-subpubic diameter. Now we only have to take in succession, by means of the smaller arm, the imprint of the anterior and posterior surfaces of the symphysis, and trace them on the paper by means of the landmarks that we have determined.”

*Special Process.*—For appreciation of oblique deformities, pelvimetry is difficult and pelvigraphy is impossible. A special process which aids diagnosis very much is necessary. The woman is to stand upright; another woman holds (at the level of the mons veneris) a plumb-line in one hand, and with the other she holds a second plumb-line on a level with the first

spinous process of the first sacral vertebra. Standing a few feet in front of the woman measured, the physician sees whether the two plumb-lines correspond. If the anterior line is at either side, we have proof of oblique deformity of the pelvis, and the side toward which the anterior line deviates is the larger half of the pelvis. The finger may then prove the result obtained by the discovery of the innominate line upon the narrowed side.

*Universal Pelvimeters.*—By this rather pretentious name we designate pelvimeters composed of several branches which articulate and disarticulate in various ways. They serve at once to measure the interior and exterior of the pelvis. Such are the pelvimeters of Boivin, Wellemberg, Van Huevel, E. Hubert, etc.

Recently Dr. Autefage, one of Professor Depaul's pupils, has invented a pelvimeter which has this advantage over all the others, of replacing Baudelocque's compass for internal pelvic mensuration, and indicating as exactly as possible the height of the womb. This instrument, besides being an universal pelvimeter, allows us day after day to follow the uterus during its period of development.

It is composed of two arms, hinged at one end and slightly curved inward near the other, the free extremity; each is terminated by a little bulb. These branches, curved upon their external faces, are flattened internally, so that, sliding one upon the other, the branches cannot only be separated but can cross each other, thus permitting an external

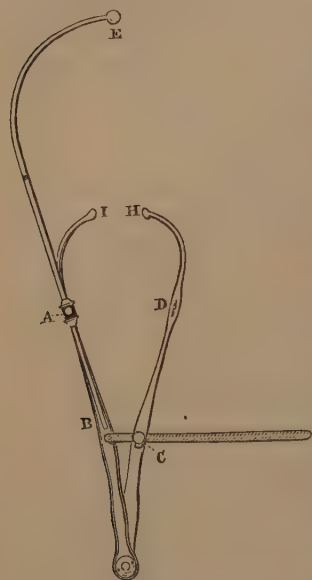


FIG. 71.—Autefage's Pelvimeter, or Metro-pelvimeter.

measure of the pelvis to be taken. The runner, graduated on both sides, indicates the amount of separation of the bulbous ends. A supplementary movable branch allows us to take the situation of the fundus uteri in the abdomen, while the smaller branch opposite rests in the vagina upon the cervix itself. The distance apart of these two arms gives the volume of the womb.

§ 3. DEFORMITY OF THE SOFT PARTS.—The uterus, the vagina, or the vulva may be deformed. Lefort (1863) has described the different deformities that may be found in the uterus and the vagina. These anomalies do not all prevent fecundation. This may occur when a womb is of the normal size, or with a womb divided by a septum (*bicornous*).

*Uterus.*—The obstacle to expulsion of the product of conception is usually located in the cervix, which may be imperforate, as Caffé saw in 1833. I saw a like case in 1859, in which P. Dubois made an artificial opening by means of the bistoury upon the anterior segment of the uterus,

using a speculum—delivery was spontaneous. It may happen that the forceps is necessary, and then we should not hesitate to use it. This deformity occurring after fecundation deserves the name complete obliteration of the cervix rather than imperforate cervix. Cauterization of the cervix with nitrate of silver in the treatment of an ulcer during pregnancy is one of the causes of this condition.

Mattéi advises, in such cases, the use of a soft sound, by means of which we can reach the body of the uterus and obtain an artificial opening. We thus avoid, he says, the hemorrhage that may accompany the use of a sharp instrument upon an organ so vascular as the uterus during pregnancy.

There is another kind of obliteration of the cervix met with, especially in primiparæ. It is due to a muco-gelatinous plug obstructing the orifice, or to a very complete penetration of the projections formed by the arbor vitæ of one lip of the cervix in the grooves of the arbor vitæ on the other lip. This last occurrence may induce sterility.

In the first instance the finger or some soft instrument readily enters the womb. In the second, graduated catheterism of the cervix with gum catheters and the speculum gradually dilates the orifice of the womb. We must be careful not to imagine either of these anomalies without repeated examinations, for it often happens that after having opened a passage for the foetus by means of instruments through the lower segment of the womb, an autopsy reveals that the cervix was present but that it was not recognized by the finger, so oblique may be the uterus at this period.

In multiparæ, cicatricial tissue resulting from previous lacerations may prevent dilatation. The same is true of morbid growths on the cervix, as cancer, especially the scirrhus form. Although properly speaking these are not deformities, it may, nevertheless, be said in a general way that by means of the tipped bistoury carried carefully along the index finger, or by means of the long scissors which are laterally curved, we may incise the cervix with little cuts from  $\frac{2}{3}$  to  $\frac{4}{5}$  in. long in various directions, especially right and left or forward, to allow the foetus to pass. This constitutes multiple incision.

*Vagina.*—Deformities of the vagina which allow fecundation and prevent expulsion of the foetus are :

*Closure*, which is often the normal state in the case of bifid uterus. It is complete or incomplete. One vagina (for there are two in such cases) is more developed than the other, and labor may not be obstructed.

*Atresia*, or *congenital narrowness*. I observed one undoubted case in an unmarried female thirty years old. There had been dysmenorrhœa, and it was for this reason that I was able to make an examination. The vagina would not receive the tip of the finger, and upon rectal touch the end of the soft stylet that had been introduced into the vagina was felt up to the cervix. Dilatation by the sponge-tent or by Demarquay's instrument is to be obtained if spontaneous dilatation does not occur.

Obliteration of the vagina may occur from persistence of the hymen, or from the existence of two or three transverse membranes. It may be congenital, like a case I saw in 1860, in which the vagina terminated like an infundibulum at a depth of 2 or  $2\frac{1}{2}$  in. The woman had not been pregnant until twelve years after her marriage. The womb was felt in a sort of rear cavity existing above the *cul-de-sac*, and which was, no doubt, perforated at some point for passage of the menstrual blood, and which had allowed fecundation to occur. This woman was seven months pregnant. P. Dubois, in order to remove her from the influence of an epidemic which then occurred in the wards, made her go home and wait till the end of pregnancy, when she was to come back to the hospital. This, unfortunately, she did not do. Obliteration may be the result of cicatricial bridles occurring after tedious labor or ulceration, and it may be an obstacle to the expulsion of the fœtus. In all cases the rule will be, first, to wait and see whether uterine contractions will not suffice, and then we must incise the vagina with a blunt bistoury, and, if necessary, end labor by means of the forceps. Suitable injections must be given afterward to prevent a return of deforming cicatrices.

*Vulva*.—Congenital smallness of the vulva has been an obstacle to expulsion of the head of the fœtus. This may be overcome by a very careful application of the forceps, or the orifice may be enlarged by two little incisions about four-fifths of an inch from the anterior commissure in the labia majora upon each side; or better still, by a single oblique incision upon the perineum. Sometimes all the different methods may be combined. Twice have I seen labor arrested by a longitudinal bridle across the vulva. Such obstacles should be excised.

§ 4. COMPLICATED PREGNANCY.—Under this head are embraced tumors either of the cervix or the body of the uterus, particularly polypoid or fibrous, coexisting with pregnancy, when such tumors or polypi prevent the passage of the fœtus into the utero-vulval canal.

A. Guéniot reports a case of this kind in the *Gazette des Hôpitaux*, 1865. The woman had several uterine fibroids, which did not, however, prevent spontaneous delivery finally. The same author noticed a cyst of the ovary complicating pregnancy. Bailly relates the case of a large cancer in the recto-vaginal fold which did not prevent natural labor at full term.

Usually the orifice dilates and delivery occurs, the tumor, if pediculated, either being pushed outside or up above the superior strait, or again, crowded over against the pelvic walls. The conduct of the obstetrician (recognizing the state of the mother) must be to aid delivery by pulling such a tumor out, or by pushing it up during the absence of contractions and keeping it in place until the child's head is well within the pelvic cavity. If unsuccessful, use the forceps or remove the tumor, especially if it is not movable. Thus Danyau—where a fibroid tumor of the posterior lip of the cervix was an obstacle to labor—removed the tumor then and there.



It weighed 650 grm. ( $2\frac{1}{2}$  lbs. avoirdupois). The labor will often be ended only by application of the forceps. When obliteration of the uterovulval outlet prevents natural delivery, we have to perform embryotomy.

There is nothing to be said here concerning bony tumors within the pelvis. They belong to deformed pelvis (*q. v.*).

Cysts are to be incised or punctured, and abscesses opened. Œdema and thrombosis often attacking the anterior lip of the cervix call for scarification when they prevent engagement of the head. Further on we shall consider thrombosis of the vulva and of the vagina.

Finally, herniæ of various kinds may occur in the vagina. In 1860 I saw a woman eight months pregnant who had vaginal cystocele. After emptying the bladder I pulled out the tumor, and delivery occurred spontaneously.

Stone in the bladder has been described as being an obstacle to expulsion of the foetus. When their volume is such that they cannot be pushed away to prevent their opposing engagement of the foetus, we must imitate Monod, who cut through the vagina and thus extracted a large stone that had been an obstacle to labor. The woman made a good recovery.

§ 5. DYNAMIC DERANGEMENTS WHICH OBSTRUCT LABOR.—Many causes may combine to obstruct the forces that belong to parturition. We shall only refer to the principal ones, for we mean to indicate here only different varieties of dystocia and the plan of treatment to be followed with those most frequently met with in the practice of our art.

In this paragraph then we shall notice :

1. Feebleness and slowness of uterine contractions.
2. Excessive energy of the same.
3. Different kinds of rigid cervix.
4. Uterine deviations and displacement.
5. Rupture of the uterus and of the vagina.
6. Thrombosis along the vulvo-vaginal track.
7. Resistant perineum.

We shall add a special paragraph for some diseases that may complicate labor, although they belong to the domain of pathology ; such conditions become at times causes of dystocia.

#### 1. FEEBLENESS AND SLOWNESS OF UTERINE CONTRACTIONS.

Contractions have commenced regularly and the obstacle cannot depend upon the foetus, whose position is favorable ; yet after a longer or shorter time these contractions become feeble, occur only at long intervals, or finally wholly cease. In the more advanced degree this constitutes inertia, though we hesitate to use this term lest it be confounded with post-partum inertia.

*Causes of Feeble Contractions.*—A. Excessive distention of the uterine

walls from dropsy of the amnion, multiple pregnancy or large size of the foetus.

*B.* Plethora of the uterine walls, recognized by the pains, which at first are violent and then gradually diminish; by the suppleness of the cervix, dyspnoea, and hardness and fulness of the pulse, all indicating general plethora.

*C.* Local conditions of the womb, whose muscular apparatus lacks force even when nothing leads us to suspect it, or when several previous pregnancies have enfeebled its contractility; or, finally, when softening, cancer, etc., have destroyed its vitality.

*D.* The general condition of the woman, which may be debilitated and exhausted by previous or coexistent diseases.

*E.* Fulness of the bladder, irregularity of uterine contractions, violent mental emotions occurring suddenly, are said to momentarily paralyze the uterine forces. Obstinate vomiting and acute pain are causes which may prevent contractions.

*F.* Cazeaux says that delayed rupture of the membranes, as well as their premature rupture, may induce slow uterine contractions. We see how, after dilatation of the cervix, if the ovum remains intact, the lower part of the membranes, which are generally resistant, may retard expulsion of the foetus by enfeebling uterine contractions. But as to premature rupture the explanation is more difficult. No doubt the presence of the membranous ovum facilitates dilatation of the cervix, and premature rupture deprives this work of some aid; but in the latter case the amniotic fluid flowing away lubricates the vaginal walls. Evacuation of a large part of this fluid leads to energetic contractions of the uterus, which cannot help but accelerate labor, and the occiput, pushed down like a wedge in the orifice, will complete the dilatation. Yet if, at the moment when the membranes rupture, the head is very low down and very large, and if it comes exactly over the orifice, it will keep back a large part of the amniotic fluid, which only flows drop by drop with each contraction; the same will happen if rupture has occurred at a part of the ovum distant from the orifice. In these cases, if labor is tedious the foetus does not suffer in the least, for it is still surrounded by the amniotic fluid.

*Prognosis.*—This is based upon the period of labor when the accident occurs. So long as the cervix is not completely dilated and the membranes are intact, the child is in no danger. It is only when the labor is prolonged for several days that the mother, worn out and restless, becomes predisposed to puerperal diseases after delivery. But once the cervix is dilated and the head engaged, since the latter rests upon the soft parts, it cannot remain there more than two hours without exposing the mother to compression and consecutive gangrene of some portion of the parturient track, whence will result vesico- or recto-vaginal fistulae. As for the child, as long as the membranes remain intact it incurs no danger; but

usually during this expulsive period the membranes rupture and the child is then liable to die of asphyxia from prolonged compression of the umbilical cord or some derangement of the utero-placental circulation.

*Treatment* will vary according to the cause. Thus, when the womb is distended excessively, rupture the membranes if the presentation is good. With uterine or general plethora, bleed [? Ed.] ; if the woman is very weak, order broths and give some generous wine during the early stages of labor ; after entire dilatation give ergot or put on the forceps (*vide infra*). If the distended bladder paralyzes contractions, use the catheter. If contractions are irregular and only act upon one portion of the womb while the other remains inert, we may by bleeding, baths, and anti-spasmodics modify this condition of the womb ; but the best remedy is the use of opiate injections in the *smallest possible quantity* of water. We may here with great advantage give chloroform by inhalation, this having been very successful in my hands. The agonizing cramps that sometimes accompany the last stage of labor, and which are due to compression of the sacral nerves, demand an application of the forceps ; though if labor is going on regularly, dry friction or embrocations over the painful spots will generally suffice. Finally, if the membranes have been ruptured and the cervix is much dilated, and the volume or engagement of the head of the foetus constitutes an obstacle to the exit of the amniotic fluid, it will be enough to gently push back the head with the fingers so as to let out some of the fluid and thus excite contractions.

Velpeau describes as a cause of slow contraction enfeeblement of the abdominal muscles from a thick layer of adipose tissue upon the abdominal walls, or to an extreme thinning, from some cause or other. In such cases a circular bandage applied over the whole abdomen reinforces the muscles of the abdomen, which act as a sort of fulcrum for uterine contractions. This harmless method may, at least, be tried before giving ergot or using the forceps.

When inertia is complete, and seems due to no cause we have named, or when the treatment has been unsuccessful and prompt termination of labor is recognized as a necessity, two thoughts should present themselves to the obstetrician's mind.

1. To *renew* the contractions.
2. To *replace* the contractions.

Almost all the above-named means are for *renewing* feeble or exhausted contraction. We may add thereto walking up and down in the room if the cervix is not wholly dilated. Formerly borax and senna injections were used, but these, to-day, are replaced by ergot. This drug has a special action on the uterus, but it has also its disadvantages, based upon physiological effects.

To replace the contractions, use the forceps if the head presents ; and version or simple extraction when the trunk or breech presents. These



means, always preferable to ergot, should not prevent the physician from simultaneously employing a little ergot to guard against continuation of inertia of the uterus after its evacuation.

### *Ergot.*

Without entering here into the natural history of ergot, we shall name the physical characters of this drug to guide the practitioner in his choice.

Ergot is deep violet externally, and elongated, curved, and thin at either extremity. It is hard and whitish internally when recently crushed. Good commercial ergot is covered with a yellowish or blackish corrugated layer, like velvet, formed by the *débris* of the sphacelus, which gathering, shaking, and flailing of the grain have detached, and which, after being damp, has dried again around the grain of ergot. The size of each grain varies greatly in length and weight. As it will be important to appreciate the weight of a grain, I weighed 48 grains of ergot, large and small, and found them representing 8 grm. (gr. cxx.). Thus 6 grains of ergot would on the average weigh 1 grm. (gr. xv. nearly).

When ergot is fresh, especially if examined in the country after the harvest, we find upon its free extremity the sphacelus, a complete body formed by the *débris* of the grain uniting with that of the mycelium and conides of the *Cordyceps purpurea*, a sort of mushroom which develops in rainy seasons and induces alterations in the grain. This parasite mushroom is yellowish, soft, and has a slightly obnoxious odor. It is also found (though very rarely) upon wheat.

*Mode of Employment.*—Ergot is usually given in the form of a freshly prepared powder; any other preparation is unreliable. The powder itself, when it has been prepared for fifteen days, loses its properties. We must often renew it. I have tried the extract of ergot in pill form, but either the extract is inferior to the powder or the properties of the drug are lost in the making of the pill, for I only obtained good results when the pills were fresh. Then I had 50 ctgr. (gr.  $7\frac{1}{10}$ ) of powdered ergot, recently prepared, placed in gelatine capsules, and kept thus ergot will preserve its properties for a long time. But at the moment we are to use it, besides the difficulty of swallowing such a large capsule, the time occupied by dissolving the gelatine in the gastric juice, added to the time necessary for the ergot to produce its effect, renders its use in this form applicable only to those cases where time does not press. Now if to simply renew exhausted contraction my method of administration could be rigorously followed, it would be ineffectual in all cases of severe hemorrhage demanding prompt and energetic intervention, as we shall see farther on.

The tincture, the same as Bonjean's ergotine, which in other uterine hemorrhages renders such great service, is a bad form to give in these cases. The powder, and only when freshly prepared, possesses the wished-



for properties. The obstetrician should have grains of ergot in a bottle in his pocket, and at the moment desired he must himself pulverize them.

The ordinary dose is 50 ctgr. to 1 grm. (gr. viii.-xv.) given in a little sugared water. We may give the same dose, two or three times, at intervals of ten minutes. Cease its administration when contractions are renewed. If vomiting occurs, give ergot *per rectum*. The powder, insoluble in water, is suspended in it, and there is no disagreeable taste. A method of administration which has prevailed among some, and which has a very rapid action, is the hypodermatic injection by means of Prava's syringe. A solution of ergotine thus given stops hemorrhage with marvellous rapidity. It may undoubtedly act in the same manner to bring about uterine contractions. Here is the formula:

Three grm. (gr. xlv.) ergotine of good quality and 15 grm. (gr. cxxv.) each of glycerine and distilled water. Inject half or a whole syringeful at the upper part of the thigh, or in the cellular tissue on the abdominal wall.

*Physiological Action.*—Ergot, which we recommend for rousing uterine contractions, is especially used after delivery to prevent or to combat secondary inertia of the womb. In both cases it acts in the same way, *i.e.*, it determines energetic contractions, which are felt from ten to fifteen minutes after its administration. These contractions, differing from the normal, which are intermittent, last usually from one hour to an hour and a half.

Hence, it results that the utero-placental circulation may be embarrassed and the foetus may suffer. A prudent obstetrician will use ergot very carefully during labor.

Montéverdi, in Italy, has called the attention of the profession to the possibility of using quinine to replace ergot. Experiments prove, and I have verified them, that sulphate of quinine acts upon uterine contractions less energetically than ergot, but if the former of these substances can replace the latter in accelerating labor, the same is not true *after* delivery, because when hemorrhages occur serious enough to put the life of the mother in danger, the physician must use a powerful drug, and then ergot takes the first place. In many conditions the forceps should be preferred, since ergot is sometimes contra-indicated.

*Indispensable Conditions.*—1. A pelvis permitting engagement of the head.

2. Dilation of the cervix and rupture of the membranes.

3. A presentation and position which are recognized and which are favorable.

*Contra-Indications.*—1. In primiparæ, for fear of rupture of the perineum if the expulsion should be too rapid.

2. The nervous condition of the individual; albuminuria may be followed by eclampsia.

3. Transverse presentations.
4. A marked tendency to cerebral congestion.
5. Any obstruction within the pelvis, as tumors, narrow diameters, etc.
6. Previous inflammation of pelvic or abdominal viscera.
7. Retention of the placenta after labor, or abortion, if the cervix tends to rapidly contract.

From restriction to restriction some have come now to proscribe ergot absolutely as long as anything remains in the womb, whether foetus, placenta, membranes, or clot. At this point the [French] Government itself has interfered, and physicians who are inspectors of births have received orders which they blindly execute, pestering families with their questions, to find out, if possible, whether midwives or physicians have not used ergot during labor.

We protest against this interference with medical practice. It is enough that the physician knows the conditions and the indications for ergot, so as to judge for himself when he shall prefer the forceps and when ergot.

Let us not forget, if ergot has been abused, that the forceps have been far more so, that this instrument has great dangers in inexperienced hands, and that he who uses it is not always disinterested.

## 2. EXCESSIVE ENERGY OF UTERINE CONTRACTIONS.

When uterine contractions are energetic and frequent, and when the soft parts, which the foetus ought to pass through, offer no resistance, labor may occur with dangerous rapidity for both mother and child. Accidents resulting from too rapid delivery, though rare, are well-nigh as grave as those which result from too slow a labor. These are :

A. *For the Mother.*—Rupture of cervix, vagina, and perineum. Rupture of the body of the womb or prolapse, when the cervix has not had time to dilate. Syncope, on account of the vessels of the abdomen being abruptly freed from compression which the uterus exerted upon them, for blood flows into them and therefore but a small quantity reaches the brain, which organ ceases to act upon the heart. Finally, a fatal mental shock and consecutive inertia of the uterus on account of too rapid emptying.

B. *For the Child.*—After rupture of the membranes the cord is liable to permanent compression, and this may kill the foetus. The utero-placental circulation may be interrupted and the placenta may be prematurely detached. Finally, the foetus violently expelled may be injured from its fall, provided the mother should be standing.

*Conduct of the Obstetrician.*—Watch the woman's bed. Give her opium injections to moderate the contractions. Tell her not to bear down ; retard, as much as possible, rupture of the membranes, and especially support the perineum ; or better still, push back the head of the foetus with

the fingers of the left hand passed beneath the pubis. Chloroform renders great service here should anæsthesia induce inertia of the abdominal muscles. The resistance of the perineum must then be recognized by the physician's hand.

### 3. RIGID CERVIX.

There are three varieties : *First*, simple or anatomical rigidity ; *second*, spasmodic rigidity ; *third*, pathological rigidity. We have already spoken of the last named.

In simple rigidity, which is quite rare, the fibres of the cervix seem to be passively resistant. This is difficult to explain, but it prevents all progress of dilatation despite the existence of uterine contractions. The latter keep up, the woman grows exhausted, and the cervix remains closed without change in the temperature of the vagina and without any exaggerated sensibility being developed. In these cases contractions are accompanied by lumbar pains.

This anatomical rigidity of the cervix is met with in very young females, or especially in old primiparæ ; in other words, whenever the cervix presents too great a resistance to dilatation.

A short time ago I witnessed it in a primipara thirty-three years old. Although labor had lasted for forty-eight hours dilatation had made no progress. Multiple incisions and the application of the forceps finished labor without any lesions of the perineum.

The *prognosis* in simple rigidity is good, since it occurs at the commencement of labor, and the intact membranes protect the fœtus. But if premature rupture of the bag of waters has occurred the life of the fœtus may be compromised. In either case the mother will be extremely fatigued.

The treatment consists in prolonged baths given from the commencement of labor and bleedings, if the woman is plethoric. Should these be unsuccessful, multiple incisions of the cervix, as we have already described, are necessary. Yet we must be careful in the latter practice, for a very thick cervix, and the presence of uterine vessels which have developed during pregnancy, may induce difficulties and dangers after the incision. If contractions are exhausted put on the forceps. (P. Dubois, Pajot, and Depaul.)

[Prolonged douche to the cervix, or the Barnes dilators are more efficient and less dangerous than local incisions or blood-letting.—Ed.]

*Spasmodic rigidity*, also called contraction, is distinguished from the preceding in that the vagina is hot and dry, the cervix very sensitive, and the orifice has a sharp and thin border, so that superficial touch cannot always recognize it.

Labor, after having proceeded regularly, stops, and the cervix, which

was slightly dilated, is seized with spasmodic contraction, which may last several hours. The head rests upon the lower segment of the womb, over which it lies exactly ; but if contraction occurs after the passage of the head, it may happen that the cervix, no longer being supported, contracts around the neck of the child, and this makes passage of the shoulders a very difficult matter.

Spasmodic rigidity may occur in plethoric females as well as in those of a lymphatic constitution. It is much more frequent than anatomical rigidity.

*Prognosis* is not serious, except in cases where the head has passed out of the cervix, and when in a breech presentation spasm occurs after the shoulders have passed, and the head of the foetus is imprisoned within the uterine cavity. Its life will then be in danger.

*Treatment* of this kind of rigidity consists in bleeding from the arm if the general state of the patient will allow, and in the use of belladonna. P. Dubois makes a little pill out of the extract, about the size of a pea, and fixing it under the nail of the index finger, he carries this up to the cervix, where the heat of the parts liquefies it. We prefer to use two fingers, and put the little pill between them. The extract is certainly preferable to the belladonna cerate, which Cazeaux uses ; yet it does not succeed in all cases, and I have seen atropine-poisoning momentarily follow absorption of the drug, and the hallucination and delirium which follow this poisoning make the friends very nervous.

I think that chloroform might be tried here. This spasmodic condition arising from a general nervous state should give way under the influence of anæsthetics. Opium might be of service.

If all these means fail, and if the mother or child run any danger from this prolongation of labor, we must make multiple incisions, as in the case of simple rigidity. It often occurs that after the first incision spasm ceases, the cervix suddenly dilates, and the head, which rests upon the cervix, is rapidly delivered.

[Again we call attention to the douche and the Barnes dilators as the most efficient means for securing cervical dilation. Belladonna has not proved of much service, though chloroform may be very useful. The production of emesis may overcome uterine spasm when other measures fail.—Ed.]

When the trunk is outside, and the contractions are upon the foetal neck, we must use the blunt bistoury, immediately incising the most accessible point of the cervix, to prevent compression of the cord and consecutive asphyxia. Then terminate labor by means of the hands. [Incision under these circumstances is rarely called for.—Ed.]

In pathological rigidity there is some cicatricial tissue or degeneration of the cervix which prevents dilatation. The only remedy to be used now is incision at a healthy portion of the cervix ; in case this is unsuccessful use the forceps.



I do not wish to omit the description of a condition which classic authors have not mentioned, before the appearance of the first edition of this book, and which is best considered here. I wish to speak of *rigid cervix during abortion*. An instance may be thus pictured. An abortion occurs toward the third or fourth month; the cervix is sufficiently dilated to give passage to the fœtus, but at this period of pregnancy the placenta is larger than the fœtus itself; a lull necessarily follows the first expulsion, but the cervix contracts and tends to close up. This is an anatomical rigidity, which results in imprisoning the placenta within the uterine cavity, and it exposes the woman to great dangers.

Without speaking here of the special treatment of retained placenta, we may say that all the means advised in the different kinds of rigidity are *not* applicable here. We owe to Joulin an excellent and simple method by which the physician can force the cervix to dilate again, viz., the *sponge-tent*.

A sponge-tent introduced into the cervix not only dilates it and permits the instruments or the hands to gain access to the womb, but often it renews contractions, and thus an abortion will be made to terminate spontaneously. Quite recently I had occasion to use this method after abortion.

[The use of the sponge-tent should give way to that of the laminaria-, or tupelo-tent. The latter have no meshes in which blood and mucus can decompose and thus increase the danger of septic poisoning.—Ed.]

#### 4. UTERINE DEVIATIONS AND DISPLACEMENTS.

The deviations which the womb suffers during gestation have been called oblique. These are uterine versions, having nothing in common with pathological versions nor with flexions that occur when the organ is empty. These deviations occur especially toward the end of pregnancy and may necessitate the intervention of art, because on the one hand engagement is more difficult, and on the other uterine contractions may act in the wrong direction.

Four varieties of obliquity are recognized: 1. Anterior obliquity, consisting in a "rocking motion" by which the fundus of the womb is turned forward, while the cervix is carried far backward. 2. Posterior obliquity, where the fundus of the womb is turned back toward the sacrum, while the cervix looks toward the pubis; touch sometimes discovers it directly under the posterior wall of this structure. 3 and 4. Lateral obliquities, right and left, in which the fundus of the womb is carried to the right or left and the cervix toward the left or right. We shall only consider extreme anterior obliquity of the womb, which is the most frequent, and that which most often demands the intervention of art. Then we shall say a word on retroversion of the womb during pregnancy.

*Causes and Results of Extreme Anterior Obliquity.*—Considerable weakening of the abdominal wall by previous pregnancies, or exaggerated distention from other causes, relaxation of abdominal muscles so that they give way more and more, and the womb falling forward and downward, the fundus may sometimes hang just above the pubis. The cervix looks directly backward in such cases, and touches some point on the anterior surface of the sacrum, and dilatation will occur with the utmost difficulty. The head of the foetus during labor engages in the pelvis and pushes before it the anterior segment of the womb, which is very much thinned and which sometimes reaches the vulva, while the cervix is carried far back and upward.

In such cases grave errors have been committed, and inexperienced physicians—thinking that they had a dilated cervix—have put on the forceps on the head, which was encased by the womb itself.

Too great an inclination of the plane of the superior strait facilitates this special anteversion, and the thinning as well as the compression that the inferior wall undergoes exposes this portion of the organ to rupture or to gangrene.

*Treatment.*—Toward the end of pregnancy make the woman wear a belt which will be a support for the womb and will reinforce the abdominal muscles. When labor occurs this girdle is still useful, but in the last stage, if uterine obliquity is not wholly rectified, two fingers must be introduced into the cervix, and the anterior lip must be caught and pulled toward the centre of the strait and held thus during a contraction, however painful such an operation may be.

Usually after one or two contractions the abnormal position is rectified and the cervix dilates. Still, if this result be not obtained we may end labor by means of the forceps if the cervix is dilated.

Pénard advises vaginal hysterotomy in these cases. I do not think that we shall ever be obliged to proceed to this extremity, and if it is practised it has always been the result of an error in diagnosis, the physician thinking that there was an obliteration of the cervix, or that the womb was imperforate.

*Causes and Results of Uterine Retroversion.*—This affection is very rare during pregnancy, and since under this name authors seem to have confounded retroflexion and retroversion, we can understand this rarity, since retroflexion when the womb is empty is most often followed by sterility.

All the causes given by gynecologists to explain the production of this deviation may be adduced by obstetricians, and contrary to other deviations, pregnancy, far from curing retroflexion, aggravates it, or at the third or fifth month transforms it into retroversion.

At the close of the third month the uterus that has been developed by gestation can no longer remain within the pelvis, and it tends to mount above the sacro-vertebral angle, but the promontory of the sacrum forces

the womb to stay in this abnormal situation. Then pains, resulting from compression of nerve-plexuses, make a physician's visit necessary. By a mechanism readily understood, contractions occur and abortion follows. In 1869, when called to a lady three and a half months pregnant, I made out within the hollow of the sacrum the fundus of the gravid uterus. Very severe intermittent pains made the family suspect approaching abortion. Retention of urine and obstinate constipation accompanied this condition. I met with a similar case several years later. In both cases the treatment employed, as will be seen below, was repeated day after day. Baths were ordered, rest was enjoined, and we finally triumphed over the danger, the fundus of the organ straightened, passed the superior strait, the severe symptoms ceased, and pregnancy went on to full term.

*Treatment.*—Put the woman in the knee-chest position, and by means of the finger introduced into the cervix, try to push the body of the uterus in a direction *opposite to its deviation*; rarely do we have to use instruments.

The same treatment is to be employed in lateral deviations; the decubitus must then be on the side opposite to the displacement.

After uterine deviations we ought to name prolapsus of the womb, which is merely a displacement of that organ. During labor and delivery prolapse may be a cause of great difficulty, especially if it is of long standing. Then the cervix may be hard and dilatation may not occur. The obstetrician, after having put the woman to bed very early, must support the womb, and if dilatation is slow, facilitate it by multiple incisions upon the cervix, so as to avoid its rupture. Delivery demands special care, and after having artificially detached the placenta we may then, and then only, try to reduce it, and in case of success the woman must be kept in bed for a long time.

## 5. RUPTURES OF THE UTERUS AND OF THE VAGINA.

*A. Rupture of the Vagina.*—Ruptures of the vagina are very rare. They may occur at any point in its course, and when they occur in the lower portion they are often mistaken for ruptures of the perineum. When they occur in the central portion of the canal they are very grave, especially as they give rise to vesico- or recto-vaginal fistulæ, which ultimately demand surgical treatment. But ruptures which occur toward the vaginal *culs-de-sac* may lead to serious symptoms and demand immediate intervention. This is the variety that we shall study.

*Causes.*—Rupture at the superior portion of the vagina may occur spontaneously at the moment when the head, in spite of the energy of uterine contractions, only engages with great difficulty in a narrowed pelvis. The contractions themselves may, by direct pressure, induce the rupture; but the most frequent cause of this lesion is the intense distention of the uterus induced by the forced introduction of the hand into its



cavity to perform version, especially when the obstetrician, contrary to rule, neglects to support the fundus. Violent contractions have also been noticed as leading to rupture. Finally, a frequent cause, and one which is not yet sufficiently studied, is the introduction of one blade of the forceps or cephalotribe in some other direction than the axis of the parts, especially when the operator uses force if the blade that has been introduced meets some obstacle. P. Budin reports several instances of this sort.

*Symptoms.*—The symptoms of rupture of the vagina are very obscure, and we do not suspect it until later on, when we make an examination of the genitals, for the pain is confounded by the woman with that caused by labor pain. But it may happen, and I have seen an instance of it, that a loop of intestine slips into the rent in the vagina and appears externally. Then the diagnosis is no longer doubtful. As for the foetus, it is usually not displaced, especially if the head is engaged when the rupture occurs. But it may occur, according to the point at which the vagina ruptures, that the child recedes partly or wholly into the abdominal cavity. Cazeaux states that it is the breech which usually first passes through the rent in the vagina.

*Prognosis.*—The prognosis is less grave than that in rupture of the uterus, which we shall soon describe; and hemorrhage is less to be feared. Peritonitis may occur, especially after rupture of the posterior *cul-de-sac*. The prognosis is bad when intestinal hernia occurs, and when a loop of intestine penetrates the rent and cannot be returned, becoming gangrenous. Pénard cites a case of rupture of the whole posterior portion of the vagina, ending in recovery, and Burns relates a case of rupture complicated by irreducible intestinal hernia, which was followed by gangrene, in which the woman finally recovered. The foetus can nearly always be extracted through the usual channels.

*Treatment.*—This consists in extracting the child through the vagina, and to do this rapidly put on the forceps in vertex presentations if the head is in suitable position. In other presentations look for the feet, and enlarge, if necessary, the rent in the vagina by an instrument, so as to pull the feet through the vulva. After delivery observe if any part of the intestine slips into the vagina. Then order absolute rest, and a few emollient injections will complete the local treatment, care being taken to wash out the uterus. In case of restlessness give opium internally.

*B. Rupture of the Womb.*—This, perhaps the gravest accident that can happen to a woman, is a solution of continuity of uterine tissue, more frequent at the end of labor than at any other period.

The womb may rupture at any point, and the lesion may involve but a portion of the thickness of the uterine tissue, or occur throughout the whole wall; hence we divide ruptures into *complete* and *incomplete*. It occurs oftenest outside of the womb, on its fundus or in the supra-vaginal



portion of the cervix. Ruptures of the infra-vaginal portion, which are so frequent, are very seldom followed by any symptoms. We shall neglect the latter. Taurin divides them into two classes :

1. Rupture of the uterus occurring during pregnancy.
2. Rupture of the uterus occurring during parturition.

*Rupture of the Uterus occurring during Pregnancy.*—*Causes.*—Some causes are called spontaneous; they may be regarded as predisposing. Others are due to external violence or traumatism, as in such cases as result from violent efforts of the abdominal walls; these are *exciting* causes.

The *spontaneous* causes depend on recent and acute lesions of the uterine walls, on old chronic lesions often produced by previous labors where progress had been slow, accompanied by incomplete ruptures closed up by cicatricial tissue, by tumors of various kinds occurring in the uterine walls, and finally by thinning or thickening of the uterine walls, either of which may be the result of the two preceding causes.

*Traumatic* causes may be external wounds (penetrating or non-penetrating), and, what is remarkable, penetrating wounds, or rather those perforations into an otherwise healthy tissue, are more often followed by cure than ruptures occurring slowly in abnormal tissue. Ruptures of the uterus from pressure come in the list of traumatic causes. According to Duparcque this rupture occurs in two ways: either the womb may rupture under the influence of external energetic pressure produced through the walls of the abdomen, or compression is produced by abrupt contraction of the abdominal muscles upon the womb. The latter necessitates the coexistence of a predisposing cause. As for external pressure, usually it leads to an abortion rather than to a rupture, except when compression is very violent, as from the kick of a horse, for example, which induces a rupture in a point more or less distant from the point kicked. Duparcque calls this "rupture from *contrecoup*." In these cases, if an old alteration in uterine tissue exists, the rupture will take place in that situation.

Older writers have classed convulsive movements of the fœtus among traumatic causes, but as Taurin says, this rupture cannot occur if the uterine tissue is normal, and if the rupture has occurred under these circumstances it must have been commenced by some previous cause which escaped observation.

*Symptoms of Rupture of the Uterus.*—When the uterine tissue is normal we may at first notice a prodromal period, which is announced by general *malaise*, more or less abdominal pain, and fever. This stage may pass unnoticed, but it is soon followed by palpable signs of rupture constituting the *second* stage; there is intense pain occurring suddenly, with the sensation of something having broken internally, and a ripping noise sometimes audible; at the same time the form of the abdomen changes rapidly, the face is altered, a chill occurs, the extremities tremble, a cold sweat

covers the body, and then syncope occurs that may terminate in collapse. Very often, at the moment of rupture, or a few instants later, hemorrhage occurs from the vulva; it may be absent, however, the blood flowing into the peritoneal cavity. The woman will then feel a gentle internal sense of warmth, and an unexpected calm follows the pain, arising, perhaps, from cessation of uterine contractions, but which will only occur when the whole fœtus or ovum passes into the abdominal cavity.

This second stage, which is always present, is never well marked except in advanced pregnancy, and when the physician can feel the more projecting portions of the fœtus through the abdominal walls. If the fœtus lives the woman will complain of vague movements, and the physician will be able to make out the displacement by means of the fœtal heart-sounds. If the fœtus is dead it acts like a foreign inert body; the movements of the woman are accompanied by distress and agony; nausea and vomiting are persistent, and at the same time the pulse becomes small and feeble. This scene may be prolonged for several hours or several days, and death occurs in the midst of intense agony. Yet, if the rupture is incomplete a portion of the ovum may engage and plug the opening of the womb, and the woman, in spite of the danger which threatens her, continues to have all the appearances of health, but the slightest movement may displace the fœtus, and the physician will witness all the symptoms that we have just described.

Depaul believes in the possibility of a cure in these cases, and in 1865 he held a clinic on a woman where we could very plainly feel the foot of a fœtus through the abdominal wall. This woman, who suffered intense abdominal pain, was delivered at full term, and after a few symptoms of peritonitis was finally cured and left the hospital. Was not this the result of simple thinning of the uterine walls, and could not the amniotic fluid, flowing out of the rupture into the abdomen, lead to a non-fatal peritonitis?

We might, with Taurin, describe subsequent phenomena (constituting a third stage in the symptoms), caused by abscess or peritonitis. Death, however, usually occurs so speedily that this period is very rarely met with.

*Prognosis of Ruptures occurring during Pregnancy.*—The results are often grave for mother and child. Indeed, the cases in which the mother recovers are so rare that they must be considered exceptional; and in addition to the condition which we have described, which leads to almost instantaneous death, we yet have to fear hernia of the intestinal loops through the uterine rent. Women who escape these dangers are never in perfect health afterward, and subsequent pregnancies often terminate in death. As for the child, it nearly always dies asphyxiated, following detachment of the placenta. Gastrotomy, practised at once, is the only treatment that can save the child's life.

*Treatment.*—This varies according to the period of pregnancy. The

foetus, indeed, may not yet be viable, and if it is viable we must assure ourselves that it is not dead.

If the foetus is not yet viable, that is, if pregnancy is not six months advanced, we ought to pay attention to the mother only. We should seek to meet the most ominous phenomena, such as the shock, hemorrhage, and the subsequent inflammation. But after the sixth month—especially after the seventh—when the foetus is living, two situations may be met: 1. The foetus may lie wholly or partially within the womb; 2. The foetus may have passed wholly into the peritoneal cavity.

In the *first* instance, if the parts are dilated or dilatable, and no obstacle opposes delivery, we must wait for spontaneous development of uterine contractions; but if the foetus is in danger we must try to dilate the cervix as promptly as possible, to extract the foetus through the natural channels. Finally, when dilatation is very slow or impossible, gastrotomy or the Cæsarean section may be advised.

In the *second* case, when the child has passed entirely into the abdominal cavity it may occur that the cervix is either dilated or dilatable, or that it is too thick or too rigid to be dilated rapidly. If it is sufficiently dilated to permit the introduction of the hand, we may try to extract the foetus, endeavoring to bring it out of the rent in the womb. If this does not succeed, and if we are certain by auscultation that the child is living, we must, according to Dubois, perform gastrotomy as promptly as possible, so as to have some chance of saving the child.

When the foetus is *dead* opinions differ. Levret still advises gastrotomy in the interest of the mother, but the deplorable results of this operation in the large cities have led us to prefer waiting to observe what occurs.

We must combat the nervous phenomena by sedatives or stimulants, and hemorrhages by cold compresses, ice upon the abdomen, the horizontal position, and suitable temperature of the room. Blood should be brought to the capillaries by friction, warm cloths upon the extremities, and sinapisms over the lower extremities. Opiates will diminish the pain. Finally, antiphlogistic measures are to be used against those consecutive inflammations which are so apt to occur.

*Rupture of the Uterus during Labor and Delivery.*—Uterine ruptures are most frequent during labor, and they are particularly met with upon the anterior segment of the organ, because of the anatomical structure of the cervix, this portion being more exposed to external violence than any other portion of the womb; and also because uterine contractions are concentrated upon this point in order to expel the foetus. Jolly and Boudin give a *résumé* of the latest advances in science concerning these points. (Paris, 1873 and 1878.)

*Causes.*—We meet here all the causes that we have adduced for rupture during pregnancy, and more definite special causes, such as pro-



longed labor, immoderate and ill-advised administration of ergot, forced introduction of the hand when the uterus is contracted, and application of the forceps and cephalotribe.

Jolly states that in twenty-eight cases there were thirteen in which the women had had more than three previous labors; among them some had seven and eight. One of these women had spontaneous rupture at her fourth and also at her fifth labor. She recovered. Hydrocephalus twice appeared as the cause. In one instance there was simultaneous rupture of the vagina. In two cases rupture followed previous Cæsarean operations; one of these women had undergone this operation twice.

In two cases there was extreme deformity of the pelvis from rickets, and once from osteomalacia.

In three cases obstetrical operations were the exciting causes. In Morel's case rupture occurred with the forceps, above the vaginal insertion of the cervix. In Crichton's case rupture occurred at the juncture of the body and the cervix.

Once the rupture occurred spontaneously after three days of painful labor, without any complication; twice rupture occurred after administration of ergot.

Let us remark that cancer, which *à priori* would be looked upon as a frequent cause of rupture, has never been adduced in the *résumé* of the thirty-eight cases above referred to; and moreover, it does not enter into the twenty-four observations made at the Maternity Hospital in Paris.

*Symptoms of Rupture during Labor.*—Here again we meet with nearly all the signs of rupture that we have already mentioned, and the obstetrician being present nearly the whole time, few of these signs will escape his observation. Let us first state that it is especially at the end of delivery that the uterus is most disposed to rupture. The rupture usually occurs spontaneously, either during a contraction or in the interval, or during some manipulation. Then occurs an intense, tearing, fixed pain, causing the woman to shriek out with a piercing cry. Sometimes the pain is cramp-like, and in all cases it is accompanied by a "ripping" noise loud enough to be heard by the woman herself and those about her. At the same time nervous phenomena appear; likewise syncope, nausea, vomiting, changes in the physiognomy, chill, cold sweat, deformity of the belly, as well as a sudden arrest of labor (which coincides with diminution in the intensity of the pain, which is replaced by a sense of numbness) occur, and the pulse grows feeble, finally becoming imperceptible, and death closes the scene.

An abundant flow of blood occurs from the genitals, though hemorrhage may be internal only. Finally, the physician must employ all means of physical exploration—touch, palpation, auscultation, and abdominal ballotment.

*Touch.*—This elicits almost certain signs of rupture of the uterus dur-



ing labor. Indeed, touch shows us the changes in the cervix, which, after having dilated, closes again when the foetus has passed into the abdomen, the change in position of the child, and the condition of the membranes, which are usually ruptured. Sometimes the finger introduced into the cervix feels the foetus, which tends to rise up in the abdominal cavity. At other times when the obstetrician wishes to pursue his investigations by introducing his hand into the womb, he will no longer feel the child, which has passed through the rent into the peritoneal cavity, but he may find the rupture generally diminished in extent because of contraction of the womb; the umbilical cord goes through this rent unless the placenta has also been detached and has fallen into the abdominal cavity. This is rare. A sign of much greater value, but unfortunately of the utmost gravity, and one that is often met with, is the presence of a loop of intestine in the uterine cavity.

*Palpation.*—This method is very important when the child has passed into the abdomen, because we may feel the foetal parts and the convulsive movements which are always executed if the child is still alive. Palpation then discovers two tumors—the foetus and the uterus—and by combining touch with palpation we are rendered more certain in our diagnosis of the uterine tumor.

*Auscultation* gives evidence of life or death of the child. Moreover, the place where the heart-sounds are heard proves, especially if auscultation has been practised before rupture, whether the foetus has left the uterine cavity or still remains there.

*Abdominal Ballotement.*—If the dead foetus has fallen into the peritoneal cavity the woman feels—in the lateral decubitus—the displacement of an inert mass which palpation may then move about and circumscribe.

I have said that ruptures of the uterus often occur instantaneously; but it may happen that rupture is produced slowly, in a gradual manner, and occurs insidiously, being marked by ill-defined phenomena, *malaise*, fever, or intense inflammatory symptoms. In that case the lesion may be overlooked or not recognized until the autopsy. But these are very rare cases and the rupture is generally a small one.

*Prognosis.*—What has been said of prognosis of ruptures occurring during pregnancy can be repeated here. It is certainly the gravest occurrence that can happen to a woman in the puerperal state. Here, however, because of the possibility of emptying the abdomen rapidly by means of the genitals, which are more dilated and more easily dilatable, the prognosis is more favorable for mother and child than when the rupture occurs during the course of pregnancy.

In the thirty-eight cases mentioned gastrotomy was performed to extract the foetus. This operation, as the sequence of rupture of the womb, may, to a certain extent, be compared to the Cæsarean section, which is so generally fatal. But although several women were operated on when in a

very bad—we may almost say a desperate—condition, in thirty-eight gas-trotomies twenty-six recovered. One of those who died had already undergone the operation twice. Convalescence lasted from twelve days to three months.

Case number thirty-three represented healing of the wound by first intention. The twelve fatal cases occurred from the sixth hour after the operation to the sixth day.

*Treatment.*—No condition demands more coolness, more prudence, more wisdom, than this, except hemorrhage from abnormal implantation of the placenta.

Treatment consists in preventing rupture, delivering the woman, and combating symptoms; whence we have three divisions: 1, Preventive; 2, obstetrical; and 3, subsequent treatment.

1. *Preventive Treatment.*—This depends entirely upon the nature of the cause, and upon the phenomena which manifest themselves in the woman before delivery. The physician ought to inquire into the antecedents and health of the woman, the number of previous pregnancies and their mode of termination. If he can make out a change in the uterus in any point upon its surface, or a general thinning, or a great exaggeration in the size of the organ, he must immediately put the woman to bed and order absolute rest and methodical compression of the belly applied at a point corresponding to the presumably least resistant point of the womb. If there be any acute inflammatory signs, combat them by antiphlogistics, administered in such a way that the life of the child shall not be compromised. Often these prophylactic measures allow the woman to await spontaneous development of labor; and as we are at the end of pregnancy we do not fear—in case there is dropsy of the amnion, for example—to puncture the membranes with an aspirator, evacuating some of the liquor amnii, thus diminishing the strain on the uterine fibres.

The causes which threaten the uterus with rupture may thus prove an obstacle to expulsion of the child. If this obstacle be an induration or a cicatrix of the cervix which prevents its dilatation, it may be incised as we have already indicated. Deviations of the orifice are easily rectified. In all the numerous cases we should remember what has been or will be said *à propos* of dystocia. Dr. Campbell, on November 15, 1852, finding a movable tumor which prevented engagement of the fœtus during labor, and which made him fear rupture of the uterus, pushed this tumor above the superior strait with the finger, and held it there until the fœtal part engaged in the excavation.

2. *Obstetrical Treatment.*—A rupture having been found to occur during labor, the most urgent indication is undoubtedly to deliver, and after that treat the hemorrhage and the symptoms that accompany it. As for delivery, we should consider whether the child remains *in situ* or whether it has passed partly or entirely into the peritoneal cavity.

When the child remains in utero, extract it by version or the forceps, according to the presentation and degree of engagement. But to employ the forceps, the foetus must be steadied with the hand externally to prevent it rising in the abdomen through the rent in the womb; we must also give particular attention to the introduction of the blades of the forceps when rupture occurs near the supra-vaginal portion of the cervix.

If an insuperable obstruction prevents removal by the natural channels, the life and death of the foetus must be considered, and also the general condition of the mother. When the foetus is dead, we prefer the cephalotribe; but if it is alive, since the life of the mother is greatly imperilled, perform gastrotomy and extract the child through the uterine rent.

When the child has passed partly into the peritoneal cavity. In this case, again, we must put on the forceps if the head is within reach of this instrument; if not, we must look for the feet and drag them out of the vulva. In case of applying the forceps, it is indispensable not to catch a loop of intestine in the blades; and also after version we must insert the hand into the uterus to push back into the abdomen any intestine which may have entered after retraction of the womb.

In these cases we possibly find ourselves forced to incise the edges of the wound, when the head of the child is seized by the uterine walls as a button in a button-hole; but if, on the other hand, the feet are in the abdomen of the mother, we must, according to Dubois, search for them through the uterine wound, even if we have to enlarge it.

These conditions, coinciding with an exceedingly deformed pelvis and a lively child, demand Cæsarean section in preference to embryotomy. Only the death of the child can make us choose the latter method.

When the child has fallen wholly into the peritoneal cavity. If the cervix and rent in the womb will permit it, the feet must be seized through these openings and dragged out through the natural channels. But we must not hesitate, for on the one hand retraction of the uterus may render all attempts to extract the foetus through these channels impossible, while on the other intestinal loops may enter in the opening and become strangulated.

If this manœuvre be impracticable, the sole fact that the child is alive legitimizes incision of the abdominal walls. Dubois, however, advises us to perform gastrotomy even when the child is dead. Taurin reports a successful instance of this.

One thing ought to be taken into account with the uncertainty of means to be employed, and that is the cervix, when the body of the organ is ruptured, remains open for a long time. Any rupture located near the cervix will usually have been preceded by regular attempts at extraction or forced delivery.

Fall of the placenta almost immediately follows exit of the foetus, and it is expelled by the natural channels even when gastrotomy has been per-

formed. Hence, following Planche, the cord should be slipped back into the womb, and from there into the vulva, by means of a sound. In some cases the placenta may be removed, with the child, through the opening made in the abdominal walls.

I have already said that after delivery we must combat hemorrhage and the symptoms that accompany it. Indeed, it is a frequent complication of rupture of the uterus. It often occurs internally and externally at the same time. The means for stopping it are known. The tampon is not applicable.

3. *Subsequent Treatment.*—This consists in combating septicæmia and successive inflammations, and, later, in sustaining the forces of the woman. If an abscess forms, open it. Watch for all labor symptoms.

#### 6. THROMBOSIS OF THE UTERO-VULVAL CANAL.

Thrombosis is a bloody extravasation occurring in the vagina or at the orifice of the vulva. It may also occur in the lips of the cervix. In the latter case it is usually found on the anterior lip, which becomes tumefied so as to be an obstruction to labor.

*Apròpos* of thrombosis, two conditions of dystocia should be recognized—the obstruction caused by the tumor, and the danger from hemorrhage following its rupture.

If the thrombus is in the vagina, the obstacle may be larger, and the danger greater. The tissue which forms this canal, as well as that which composes the labia and the vulva, is very vascular; and we know how easily at this place varices form during pregnancy.

Especially in women who have varicose tumors is thrombosis liable to occur from rupture of these veins, either spontaneously or as the result of some external violence, or through the very effort of labor itself; the blood then extravasates into the cellular tissue and the thrombosis follows. It may form without previous varices; sometimes it only appears after delivery.

These tumors are ordinarily preceded by the occurrence of great pain in the part where they are to occur, and after forming their distention is such that the quantity of blood poured out may be great enough to endanger the life of the mother. Sometimes the extravasation reaches the greater pelvis. When the thrombus is low down we may make out a violet or bluish tint of the skin, which rarely can be mistaken. No pulsation is felt, but when the blood collects in a mass fluctuation can be felt.

Thrombus may rupture spontaneously, and hemorrhage may endanger the life of the mother. The danger which she runs may be occasioned by gangrene or suppuration which succeeds the first symptoms. The prognosis will then be very grave. Blot gives five deaths out of nineteen cases.

The treatment of thrombus occurring during labor consists in incising



it if the tumor is large enough to obstruct the passage of the head. To stop hemorrhage, if labor does not terminate quickly tampon the spot, after having cleared out all the clots. But after delivery do not incise unless the size of the tumor, or its advanced condition, leaves no hope of absorption.

When we decide to incise, we must make a long incision, so that the clots can readily be evacuated. If consecutive inflammation occurs, combat it by proper injections, given with great care.

#### 7. RESISTANT PERINEUM AND VULVA.

We shall say but a few words on this subject in this connection. It is one of the causes leading to slowness of uterine contractions. It occurs in primiparæ, and especially in those who have their first child at an advanced age. It is to the resistance of this musculo-aponeurotic plane to which we must ascribe delayed labor in this instance, and not to ankylosis of the coccyx, as Dewenter states.

I have made it the subject of a special paragraph because of its frequency, because it necessitates the application of the forceps to the exclusion of ergot, and because it leads to a peculiar accident, of which we shall speak when we come to complications of pregnancy, viz : rupture of the perineum.

The time of intervention will depend upon the general state of the mother and the health of the fœtus, the rules that we have given concerning inertia being applicable here. But once it is decided to employ the forceps tractions must be made with great slowness, so as to allow time for the tissues to dilate and their rupture be avoided.

One means little employed until now, but which will, I think, be followed with good results, is anæsthesia. The nerves which supply the perineum are relaxed by chloroform, and thus there is no further obstacle to the exit of the fœtus, while the womb, receiving filaments from the sympathetic system, preserves its integrity of action, and may all the easier overcome the resistance of the perineum when the latter has lost its rigidity.

Finally, it may happen that with this cause of dystocia a natural narrowness of the vulva exists. Then if contractions are slow we must employ the forceps, after we have waited a reasonable time (an hour to an hour and a half) to see if the parts are becoming distended. In these cases we prefer to use the small English forceps. If the contractions are energetic, in order to avoid any rupture of the mother's parts two little incisions may be made while the vulva is strongly distended. These incisions, about  $\frac{2}{3}$  in. long, should be made upon the sides of the orifice, an inch and a half from the anterior commissure, or a single incision may be made in the median line obliquely either at the right or at the left of the

rupture of the perineum. These incisions have the advantage of inducing easy dilatation, of avoiding a rupture the extent of which we cannot always limit, and of favoring rapid cicatrization. Yet we must practise incisions very carefully. Sometimes hemorrhages follow from the cutting of a small artery.

#### SOME DISEASES THAT MAY COMPLICATE LABOR.

1. *Hæmoptysis; Hæmatemesis*.—If spitting or vomiting of blood is slight there is no immediate danger to fear, and we may wait, letting the woman half sit up, calming her terror, which the sight of blood always induces at this time, by removing anything that may induce chest troubles.

When the symptoms are more serious we must treat them as usual, *i.e.*, by bleeding, cold, acidulated drinks, sinapisms to the feet, and hasten to terminate labor by forceps or version, according to circumstances, should life be in danger.

2. *Cerebral Congestion*.—Injection of the face, vertigo, dizziness, ringing in the ears, troubles of sight, a sense of weight in the head, enfeeblement of mental faculties, and sometimes loss of consciousness, numbness of the extremities, embarrassed speech, and a full pulse, are the characteristics of this condition, which should be treated by an almost vertical position of the trunk, by cold to the head, revulsives to the lower limbs, and bleeding. [Be sure that uræmia, as a cause, may be excluded.—Ed.]

3. *Epistaxis*.—It may occur that during labor obstruction of circulation in the abdominal vessels and reflux of blood to the upper parts of the body, instead of inducing congestion, may give rise to salutary epistaxis. But if this nasal hemorrhage becomes profuse, we must combat it by cold applications to the forehead and back, making the woman snuff vinegar or alum-water, and if these means are not successful we must plug the posterior nares.

4. *Syncope*.—In case of frequent syncope we should order rest, the horizontal position, broths, cordials, stimulants, and all the means that may restore circulation. If in spite of this they continue we must induce artificial labor as soon as possible.

5. *Hernia*.—Any hernia should be reduced or maintained, either by an appropriate band or by the palm of the hand. It will be easier to have compression made over the ring whence the intestine issues by an intelligent assistant. Prudence demands that we should end labor by the forceps or version when we fear the exit or the strangulation of new loops of intestine.

6. *Aneurism*.—In this case compress the aneurismal tumor, and if the contractions are too powerful we must, by artificial delivery, free the woman from danger of rupture of the sac, which violent efforts might bring about.

7. *Pulmonary and Subcutaneous Emphysema*.—The efforts of the woman in labor compress the air within the lungs or in the bronchi to such a degree that the pulmonary air-cells are sometimes ruptured, and an emphysematous tumor may be formed which sometimes reaches enormous proportions.

I have seen these emphysematous tumors develop between the ribs, above and below the clavicle; they never induced any symptoms, and were finally gradually absorbed.

But rupture of pulmonary alveoli may induce general emphysema of the lungs, ending in death. (Depaul.)

Emphysema demands no treatment, but if air accumulates about the trunk and causes dyspnoea, make small punctures with the lancet. For fear the disease will grow worse as labor progresses, deliver artificially.

#### ART. II.—FETAL DYSTOCIA.

Joulin (Paris, 1863) divides foetal dystocia into eleven classes. Another simpler and more practical division is that of A. Herrgott (1878), the young member of the medical faculty of Nancy, which first considers foetal disease that obstructs the exit of the head, hydrocephalus especially; then those that obstruct delivery of the trunk; thirdly, diseases that alter the volume and form of the foetus, and finally, monstrosities. We shall only consider the most frequent cases met with in practice:

1. Malpresentations and malpositions.
2. Procidencia of the limbs.
3. Twin pregnancies and adherent foetuses.
4. Extra-uterine pregnancy.
5. Enlargement of the foetus from various causes.

§ 1. MALPRESENTATIONS AND MALPOSITIONS.—The first malpresentation is the *trunk*. Spontaneous evolution is so rare, and the dangers that the foetus runs are then so great, that one should never hesitate to perform cephalic or podalic version, according to circumstances.

*Inclined or Irregular Positions*.—We have defined inclined or irregular positions and have seen that they usually straighten and terminate spontaneously. It may occur, however, that inclined positions of the vertex and face do not become normal. If dilatation of the cervix is incomplete the first thing to do is to rupture the membranes, should these be intact, and endeavor to regulate the presentation with the hand. This cephalic reduction I successfully practised in one case of inclined position recorded in *La Gazette des Hôpitaux*, No. 64, 1866. One blade of the forceps may be used as a lever, but if the manual operation is unsuccessful it is simpler to apply the forceps in the usual way; for after straightening the head the instrument may be used for the purpose of extraction. Guéniot relates a case of paralysis of the brachial plexus occurring after use of the forceps

upon a head having an inclined position; hence he prefers cephalic reduction. Podalic version demands great mobility above the superior strait, and if the waters have long since escaped the uterus contracts on the fœtus and renders it immovable.

In two other cases I was forced to use the forceps. Once when the head was inclined in the superior strait it was brought into the pelvis by one application of the forceps, a second application finishing rotation and extraction. In another case a single application extracted a living child. These two cases were complicated by deformed pelvis, and in one the deformity was so great that cephalotripsy had been demanded at a former labor. (Modolúa.) I saw a similar case with Dr. Linas, who had to apply the forceps when the head was oblique, although it had descended upon the floor of the pelvis. He thus succeeded in delivering a woman of a living child, the pelvis itself being normal. In this case the cause of the inclination of the vertex seemed to be great obliquity of the uterus.

*Occipito-Posterior Positions of the Vertex in the Pelvis.*—Delivery being possible in these cases we generally wait for engagement, and only when internal rotation is absent does the occiput, instead of engaging underneath the pubis, swing into the concavity of the sacrum. Labor usually terminates spontaneously, the occiput being the first to cross the anterior commissure of the perineum, threatening it, however, with extensive rupture. It may also happen that exhaustion of the contractions will occur here, or some danger to mother or child demand intervention of the obstetrician. There is nothing to do but put on the forceps. A complex question arises here: Should we, with the forceps, attempt to bring the occiput under the symphysis pubis or aid its delivery as occipito-sacral? With Pajot, when the occiput rests directly upon the perineum I prefer the latter method. If, on the other hand, it is on a level with the sacro-iliac synchondrosis I should try to rotate it forward by means of the forceps.

In the latter case two applications are necessary, and the child will be in little danger from exaggerated twisting of the neck. By operating slowly we avoid this danger. The "posterior" delivery is only to be thought of, then, when the size of the head or a slight diminution of the sacro-cotyloid diameter prevents "anterior" engagement. (See Sentex's "Memoir," 1872.)

*Mento-Posterior Face Positions.*—These, like occipito-posterior positions, may end spontaneously when internal rotation occurs, the chin coming under the symphysis pubis. Of five of my mento-posterior positions, reduction was spontaneous in three. Two of the children lived, but one soon succumbed from the length and difficulty of the labor. If rotation does not occur delivery is impossible, very different from what is the case in occipito-posterior positions. In the latter position the head, extremely flexed, forms an inclined plane continuous with the back of the fœtus,



which slides over the anterior surface of the sacrum and distended perineum, thus rendering delivery possible. But if the chin is behind it cannot swing through the same arc, since the neck only measures  $2\frac{1}{2}$  to  $3\frac{1}{2}$  in., while the sacrum and distended perineum measure no less than 10 to 11 in. Hence for delivery to occur the chest of the foetus must descend with the head, which is an impossibility with a living foetus at full term in a normal pelvis.

If before engagement we can make out a mento-posterior face presentation, to provide against difficulties when uterine contractions are feeble we may try and convert this into a vertex. This may be done (internally) by the hand or the lever. Profiting by the integrity of the bag of waters, if the pelvis will allow we may rupture the membranes and perform podalic version. But the diagnosis of such a position before rupture of the membranes may be very difficult, and usually when the position is recognized the head is already engaged. To avoid embryotomy there then remains only the double application of the forceps, of which we have already spoken, so as to bring the chin rapidly forward where it should have come of itself.

The dangers encountered by the foetus are great; but we have no choice, and our predecessors succeeded, at times, in delivering living children. The use, in these cases, of the straight forceps will avoid a double application.

[We should urge that in every case the attempt be made to convert the face into a vertex presentation, such efforts having been very successful in our hands.—Ed.]

§ 2. PROCIDENTIA OF THE LIMBS.—*Vertex or Face, with Procidentia of the Arms.*—Several varieties may occur:

A. After rupture of the membranes one or both hands may lie at either or both ends of the bi-parietal diameter of the foetal head, thus increasing its width. This incomplete procidentia does not always prevent delivery.

B. Will the result be the same when an arm falls completely below the head? We can usually answer yes: this arm will not prevent spontaneous expulsion; but since it retards it we must try and reduce it. Between the contractions push, *with the hand*, the presenting arm above the head of the foetus and hold it there until a contraction occurs. Quickly withdraw the hand, and the head coming down on the lower segment of the uterus will prevent return of the procidentia of the arm. Yet this procidentia sometimes recurs, do what we may. Then, if nature does not end labor put on the forceps, taking care not to include the arm.

C. Finally, both arms may come down before the head. The difficulty of reduction and the greater difficulty in applying the forceps lead us to prefer podalic version when this is possible.

*Vertex or Face with Procidentia of the Feet.*—This is a more serious

complication than the former. When one foot comes down we must try to push it back above the superior strait. If unsuccessful, perform podalic version, tying a tape to this foot while we feel for the other. But should head and foot be so wedged that version is impossible, use the forceps, or as a final resort perform embryotomy. A simple perforation of the cranium generally suffices.

If both feet come down, or one foot and one hand, the rule is the same—by reduction, then the forceps, and finally embryotomy. I saw Chantreuil terminate, with the forceps, a complicated case, where both feet came down under the head.

§ 3. TWIN PREGNANCIES AND FŒTAL ADHESIONS.—Three varieties of twin pregnancy should be made, according to Budin (Paris, 1882). In the first, one foetus lies in the left, the other in the right half of the womb. This, the usual variety, we have chosen as the type of twin pregnancy in our descriptions.

In the second variety one foetus is *above* the other. In Budin's cases he found that the foetus at the fundus lay transversely; that occupying the lower segment may present the trunk, head, or breech. The womb is then very large transversely, especially superiorly. Palpation readily discovers the two foetal extremities, which occupy the fundus, the head being on one side, the breech on the other. The foetus in the lower segment usually has one of its extremities engaged, the other being hidden by some part of the foetus above it. On auscultation we hear the heart-sounds at two points; the maximum intensity of one being above the umbilicus, the other below. When we make an examination after labor different aspects are seen, according as there was one or two placentas; but in all cases we find two envelopes superimposed. After having opened the lowermost we must pass through its cavity in order to reach the transverse barrier separating the two cavities; this diaphragm is to be opened to reach the second ovum.

In the third variety one foetus is *in front* of the other. Here the belly is very prominent and the abdominal walls are very thin. The abdomen is unusually large, although its transverse dimensions do not appear to be much exaggerated, and certainly are not, in proportion to the antero-posterior diameter. The most careful palpation only allows us to feel two foetal extremities and the characteristics of the back. Upon auscultation we search in vain for heart-sounds at two different points; there is but one point of maximum intensity. Despite our suspicions we have no certain signs. In one case (Ribemont) the diagnosis was made with exactitude.

It may happen, in these cases, that one foetus presents the breech, the other the vertex. But when the first child has been all delivered but the head, the head of the second may stop labor, having come down too quickly and being locked beneath the first.

From the beginning of labor we should endeavor to keep the pelvic extremity of one foetus above the superior strait, to favor descent of that which presents the head. When the latter engages, and the cervix is sufficiently dilated, apply the forceps and end the labor.

The prognosis in vertex delivery being much more favorable than in breech, if we do not succeed in the above manœuvre we shall have to sacrifice one of the children. Pull on the feet of the one that presents the breech and decapitate as soon as the neck can be reached. Deliver the other child with the forceps, and then look for the trunkless head in the womb.

It may also happen that one foetus presents a shoulder, the other the vertex, and then, as in Jacquemier's case, the neck of one will lock across the neck of the other, this arrangement proving an inseparable obstacle to labor. After having tried one application of the forceps upon the head in the pelvis, we are forced, when unsuccessful, to reduce the head by cephalotripsy, to allow delivery of the other foetus by podalic version.

Finally, when several limbs belonging to different children engage, we must try to reduce them so as to perform podalic version with *one* foetal foot, and yet be sure we are not engaging two members belonging to different children. (Plesmann, quoted by Cazeaux.)

In these cases it is difficult to give any fixed rules; the physician must use his own judgment, always regarding the mother's life as more important than the child's.

A complication, *à priori*, seeming quite dangerous, is when the twins are adherent, like the Siamese twins and Millie-Christine (who were exhibited in Paris). Fortunately these adhesions are generally lax enough to allow of spontaneous delivery, which, moreover, in these cases is commonly premature. The delivery of Millie-Christine occurred without complication to the mother.

I shall not refer to monsters, except those adherent at neck, trunk, or breech, making Geoffroy Saint-Hilaire's classification of cephalophagans, xiphophagans, and ischiophagans. (See works on Teratology.)

§ 4. EXTRA-UTERINE PREGNANCY.—We have already studied extra-uterine pregnancy—its site, diagnosis, etc. (See p. 61.)

§ 5. INCREASE IN THE SIZE OF THE FÆTUS FROM VARIOUS CAUSES.—As producing dystocia we shall consider this from five standpoints:

1. An enormously developed foetus.
2. Congenital hydrocephalus.
3. Hydrothorax ascites and retention of urine.
4. Foetal tumors.
5. Dead or emphysematous foetus.

1. *Enormously Developed Fœtus*.—This cause of dystocia sometimes occurs, but it is rare. Dugès long since gave it as a cause of tedious labor; but, he says, if all the other conditions are favorable, labor will

probably terminate by natural forces. He regards the condition as a complication, especially when it is necessary to perform podalic version.

The average weight of a child at term is  $6\frac{2}{3}$  to  $7\frac{7}{10}$  lbs. avoirdupois. But children have weighed  $8\frac{1}{2}$  lbs.,  $9\frac{9}{10}$  lbs.,  $13\frac{1}{2}$  lbs. (Lachapelle),  $14\frac{3}{10}$  lbs. (Baudelocque),  $15\frac{2}{3}$  lbs. (Merriman),  $16\frac{1}{2}$  lbs. (R. Croft), and Owens saw a still-born child weighing nearly  $19\frac{1}{2}$  lbs. These enormous infants are not said to have caused any difficulties during labor. In one case Cazeaux had to perform version for a shoulder presentation, it being, as he says, a very difficult operation. The child (which died) was examined by Dr. Riebault; it weighed  $19\frac{1}{2}$  lbs. (avoirdupois) and its total length was  $27\frac{1}{2}$  in.

Joulin states that excessive development may occur at one particular part. The head may be enormous, apart from hydrocephalus, and he describes also a degree of ossification incompatible with reducibility of the parts. Joulin will not employ version here, but prefers the forceps or the cephalotribe.

Abnormal increase of the chest and shoulders may (Joulin) be a cause of dystocia. Jacquemier, in a memoir on this subject, relates nine such cases in support of Joulin's views.

An enlarged fœtus puts the case on a footing with a normal child and a small pelvis. There is an advantage, however, in favor of the latter: in deformed pelvis we can measure the degree of diminution, whereas we cannot learn how much a fœtus is enlarged above the normal; thus we are in an embarrassing position.

Finally, let us see what is the influence of the father's stature on the size of the child. Large and strong men have a liking for little women, and *vice versâ*; hence result great difficulties, oftentimes, from their marriage.

Many large children induce no dystocia whatever.

2. *Congenital Hydrocephalus*.—This is an accumulation of serum in the cavity of the arachnoid or in the ventricles. There are three degrees: 1. Slight hydrocephalus, where spontaneous delivery may occur, though labor may be tedious. 2. A form compatible with extra-uterine life, but where intervention is usually demanded. 3. It may be so great that delivery cannot occur without destruction of the fœtus. But as with this degree of hydrocephalus the fœtus usually dies in the womb before labor begins (if the child has for some time been macerated in the liquor amnii), the head elongates, the bones override, and engagement is possible.

Chassinat (of Hyères) has written an article (*Gaz. Méd.*, 1865) on hydrocephalus as an obstacle to labor. He gives 28 cases, 21 of which were vertex presentations and 7 breech. To this we shall recur.

*Diagnosis*.—The cervix is dilated, the membranes are, ruptured, but energetic contractions do not suffice to engage the head in the pelvis, whose diameters are normal. If now we employ *touch*, we shall find the head very large, almost flat instead of being pointed; that there are very



large membranous spaces, sutures, and fontanelles, which diminish during a pain and dilate afterward, and in which we can at times obtain fluctuation. In severe cases the parietal bones seem like bony islands; the skin is thinned and tightly stretched over the bones, and the scalp has only a few sparse hairs on it. In some cases there is complete baldness.

Hydrocephalus often coincides with other deformities; the diagnosis is always very difficult, and in 28 of Chassinat's cases mistakes were made 17 times. Sometimes we have to introduce the whole hand into the vagina to examine the head, which remains at the superior strait.

One source of error is the development of sutures and fontanelles, which, at first view, might lead us to suspect persistence of the bag of waters. But running the finger about the cranial vault, we find by the side of the membranous spaces bony edges that bound them. The rarity of the disease is also a cause of error.

Difficulties in breech presentations are much greater; the volume of the head alone, felt through the walls of the abdomen above the superior strait, is not a sign warranting the diagnosis of hydrocephalus. True, the shortness and thickness of the occipital bone have been noticed upon touch; but a better sign is sudden infiltration of the cellular tissue of the neck and back, following traction especially. (P. Dubois.) Still this sign is often lacking, while touch discovers the extent of the lower lateral fontanelles and the fluctuation which may be felt there. Coexisting inertia uteri is often noticed on the part of the mother; this is, no doubt, due to the thinning of the organ due to exaggerated development of its contents.

*Prognosis.*—Of nineteen cases of congenital hydrocephalus all the children survived delivery, but only for a short time, and had but a sorry existence, the functions or organic life alone being intact. All were born spontaneously. The prognosis is still graver when we have to deal with the second and third degrees of the malady, which demand interference and often embryotomy.

*Indications for Treatment.*—Here we shall consider vertex and breech presentations; in the former we shall only discuss the second and third degrees of hydrocephalus, which cannot end by spontaneous delivery.

In hydrocephalus of the second degree, after waiting to see whether contractions are capable of engaging the head, put on the forceps, and then, if unsuccessful, puncture the cranium by a trocar at the level of a suture or fontanelle, holding the instrument obliquely so as not to injure the brain. Experience proves that in case of moderate hydrocephalus it suffices to let out a part of the fluid within the skull to deliver a living child.

Only in cases of extreme hydrocephalus, when puncture and forceps have failed, can we perforate to diminish the size of the head.

If the foetus presents by the breech, after the trunk is wholly out of the vulva the reduction of the head becomes most difficult.

In 1872 I was called by Dr. Desportes (of Charenton) to see a case of dystocia, the cause of which could not be determined.

The woman had been in labor twenty-four hours; the child (presenting the breech) was born up to its neck; it had died during labor. On my arrival I found the abdomen very large and hard—so much so that twin pregnancy was suspected; but as the woman was well formed it was not likely that twin pregnancy would have offered so great a difficulty, unless adhesions were present. Carrying my hand into the uterus to find out the cause of non-engagement of the head, I recognized hydrocephalus from the fluctuation and large size of the lateral fontanelles. I then decapitated the child, but no fluid came out of the foramen magnum; so sliding a sharp *crochet* along the palm of my left hand (the occiput being at the left) I punctured the anterior fontanelle. A large quantity of water immediately flowed, and firmly grasping the *crochet*—my left hand remaining in the womb to protect the mother should the instrument slip—I gradually brought down the face, forehead, and vertex until the anterior fontanelle was on a level with the superior strait.

Then I left labor to nature. Contractions finished the scene: the fluid flowed away, the cranial bones overlapped, and in a few hours spontaneous delivery occurred. There were no evil after-effects. The head I presented to the Academy in 1872.

The occipito-frontal diameter in the recent state was  $8\frac{1}{2}$  in. instead of (the normal)  $4\frac{1}{2}$ . All the other diameters were proportionately enlarged.

The woman afterward became pregnant and gave birth (spontaneously) to a perfectly healthy child. Nothing causes us to fear, in such cases, that there will be a material predisposition to conceive deformed children, the cause being inherent in the infant's individuality.

[We would declare our belief in family tendency toward hydrocephalus.

Further, we may allude to an extreme case of hydrocephalus seen by us, from which, after perforation, the fluid discharged was ninety ounces. After birth the head was distended by plaster-of-Paris poured in through the foramen magnum, and the circumference was found to be twenty-two inches—about that of the head of an adult.—Ed.]

3. *Hydrothorax, Ascites, and Retention of Urine.*—Since hydrocephalus is a recognized foetal malady, why is not hydrothorax? Hohl, quoted by Joulin, reports two cases. Gottel saw it in a seven months' foetus. But usually this disease is more nearly related to ascites. Ascites may exist alone. Dr. Chaudesaigue (Sèvres) presented to the Society of Practical Medicine of Paris (February 7, 1869) an ascitic foetus, which he extracted when called in by the midwife who attended the mother. Dr. B. Anger made the *post-mortem* and found abnormal thickness and an opaline color of the peritoneum, produced, probably, by its maceration in the ascitic fluid.

Other examples could be adduced. Retention of urine from imperforate urethra may lead to extreme dystocia. (Depaul's report to the Academy, February 26, 1850.) In this case distention of the bladder coincided with ascites, and Depaul's treatment may serve as a rule whenever there is a considerable amount of fluid in the thorax, abdomen, or bladder, so that labor is obstructed.

Depaul (in his case) diminished the volume of the foetus by making two successive punctures to evacuate the fluid. After this, delivery took place without difficulty. (See "Th. d'Agrégation," Herrgott, Paris, 1878.)

4. *Foetal Tumors*.—Among the principal foetal tumors that prevent spontaneous delivery are spina bifida with hydrorachitis, abnormal renal development, cysts of various kinds, and solid and parasitic tumors, the treatment of which will be understood by the physician.

5. *Dead or Emphysematous Foetus*.—After death of the foetus and rupture of the membranes, the air having free access to the uterine cavity, the foetus will putrefy and emphysema will develop if it is not soon expelled.

The diagnosis is generally easy: a sanious fluid flows from the genitals, exhaling a fetid odor; the abdomen enlarges in size, there is tympanitic percussion over the hypogastrium, and the mother's general condition may be grave.

Indications in behalf of the mother are to reduce the size of the foetus and extract it.

Such was the plan of obstetricians in two instances. In one (Depaul and Chassaingnac) the labor was ended by an application of the cephalotribe to the trunk. The other (Legouais, of Nantes) demanded several applications of the forceps.

We may have to make incisions to let out the gas which augments the size of the foetus. If emphysema seems localized in the abdomen (partial tympanites), we may be forced to practise evisceration to reach the diaphragm, after having cut the clavicle and removed the lungs, so as to let the gas in the belly escape through the diaphragm.

This dangerous and difficult operation should be dispensed with whenever the cephalotribe can diminish the size of the foetal trunk.

### ART. III.—DYSTOCIA DUE TO THE APPENDAGES.

Difficulty caused by the appendages of the foetus in spontaneous labor is due only to anomalies in the length of the umbilical cord. Those which depend upon infiltration, faulty resistance, varices, etc., we shall not consider. Difficulties arising from the placenta will be considered in the following chapter, for they rather obstruct *delivery* than labor properly so called.

The anomalies in the umbilical cord are: 1, Shortness; 2, abnormal length.

§ 1. SHORT CORD.—Authors make two kinds: *normal* and *accidental* short cord; but the latter, which rather depends upon excessive length, will be considered under that head.

Normal shortness of the cord does not permit the foetus to be spontaneously expelled.

How short must the cord be to cause dystocia? What are the accidents induced? What are the signs, and means of treatment? These are the points we have to consider.

The umbilical cord is ordinarily 50 to 60 ctm. long (20 to 24 in.), but delivery readily occurs when it is 40 ctm. (16 in.). It cannot be otherwise, since the uterus at the end of gestation measures 32 to 37 ctm. in length ( $12\frac{4}{5}$  in.), and since the placenta is rarely inserted at the *very* fundus, it follows that the cord 40 ctm. (16 in.) long is quite sufficient to allow of delivery. Moreover, if one considers that the womb, at the moment of contraction, sinks and approaches the vulva, one can understand how delivery may occur with a still shorter cord, since the two insertions of the cord are always at the same distance when the head of the foetus descends and the length of the vaginal canal, as it were, disappears. Experience proves, indeed, that delivery can very well occur when the cord measures only 35 ctm. (14 in.). This is evidenced by several observations that I gave to Dr. Fournier for his inaugural thesis (1865). In two cases the cord was only 34 to 35 ctm. long ( $13\frac{3}{4}$  to 14 in.). The children were delivered living, but the first delivery was complicated by detachment of the placenta during expulsion of the child; in the second, labor lasted twenty-four hours; a large sero-sanguineous tumor testified that the head had been for a long time arrested, and the foetus had expelled considerable meconium. Forceps ended this labor.

There have been a large number of instances in which the cord has been very much shorter. Cazeaux saw one 23 ctm. long ( $9\frac{1}{4}$  in.); the head remained fixed for fifteen hours after rupture of the membranes and complete dilatation. In the thesis referred to a primipara at the eighth month gave birth to a foetus whose cord was only 26 ctm. long ( $10\frac{3}{8}$  in.); the child was still-born and weighed 2,120 grms. ( $4\frac{7}{10}$  lbs. avoirdupois), and, as labor lasted twenty-seven hours, I attribute this delay as much to the death of the foetus as to shortness of the cord, since the pelvis was a well-formed one. Joulin reports a case (of Dr. Pies, of Mayence) where, with other deformities, the cord was only 16 ctm. long ( $6\frac{3}{4}$  in.). It has been found 13 ctm. ( $5\frac{1}{4}$  in.) and even 5 ctm. (2 in.) long. Drs. Mende and Selafer found sessile placentas, that is, those where there was no cord. In Selafer's case (*Union Médicale* of October 5, 1855) separation of the placenta from the foetal abdomen occurred abruptly when the forceps was put on. The child died from subsequent hemorrhage.



Thus from the accidents that occur when the cord is shorter than a given limit, we are authorized to say that a cord is "short" when it is under 35 ctm. (14 in.).

The accidents that may be induced by a short cord are tedious labor, premature detachment of the placenta, hemorrhage, rupture of the cord, death of the child, and inversion of the uterus.

The signs by means of which we recognize a short cord during labor are very obscure. One after another authors have stated that the advance of the head with each pain is lost by its ascent in the interval; but since the same symptom has been given for a resistant perineum, and since it may also occur when certain pathological tumors prevent engagement—if, indeed, there do not exist simultaneously painful twinges on the side where the placenta is attached in the womb—the indications in question are without value. Another more conclusive sign, if it could be recognized, is the alternate cup-like sinking and elevation of the fundus uteri when the placenta is inserted at this point. But this diagnosis cannot be established until after the partial exit of the child.

The only sign that is readily made out is engagement of the breech, which appears bent upon the lateral plane of the foetus on account of approximation of the uterine orifice and of the progression of the umbilicus. In presentation of the breech, when the umbilicus arrives at the vulva, and even a short time before, when there is tedious labor, it will be easy to discover tension or twisting of the cord by means of the finger passed above its umbilical insertion; but this shortness may also arise from loops of the cord, as we shall see in the following article.

*Indications for Treatment.*—If at the moment we make out this complication the membranes are intact—which is not probable—we must rupture them in order that the womb may contract upon itself, and so approximate the two extremities of the cord, always supposing the cervix to be dilated.

If the head has already reached the pelvis apply the forceps, and when it passes the vulva cut the cord. When it has only the soft parts to pass, favor delivery of the foetus by supporting the perineum and by pressure on the hypogastrium, to prevent the uterus from rising during the interval between the pains. In breech presentations, when the cord can be reached cut it as quickly as possible and extract the foetus.

§ 2. ABNORMALLY LONG CORD.—When the cord is 65 ctm. long (26 in.) it may be a cause of dystocia from excessive length. The cord is far oftener longer than shorter than normal, and may attain considerable length. Baudelocque, L'Héritier, and Schneider have seen cords that measured 1 m. 30 ctm. (4 feet), 1 m. 50 ctm. (56 in.), and even 3 m. (3 yards and a little over) in length. Several times I have seen cords 90 ctm. (36 in.), 1 m. (a yard and a little over), and 1 m. 10 ctm. long (40 in.). These are not very rare cases.

A long cord induces three kinds of dystocia which the physician must recognize :

1. Loops of the cord which may induce accidental shortness.
2. Knotted cord.
3. Prolapsed funis or falling of the umbilical cord.

1. *Loopings of the Cord*.—Authors have attributed the loops that the cord may make around the neck, trunk, or extremities to movements of the foetus within the uterine cavity. Formation of loops is evidently favored by the excessive length of the cord, and a long cord may thus become too short. The symptoms of a short cord will be then present, but with new dangers to the foetus—dangers which make this anomaly of graver significance than the former.

The positions of the cord around the child are very variable. Often we see loops around the neck, sometimes making several turns. In one case Baudelocque found seven, Schneider six, and several times I have seen two and even three loops. Waldvogel found eight loops. (*Gaz. Obst.*, No. 21, 1873.) Less frequently the cord is looped around the extremities, and in this class of cases, when the constriction is considerable there may occur what Montgomery calls spontaneous amputation of the limbs within the uterine cavity. Finally, the cord has been found to pass between the thighs, go up behind the back, and then loop itself around the neck.

Loopings of the cord have been noticed by Mayer 19 times out of 100 ; by Devilliers, 3 times out of 100 ; by Beale, 20 times out of 100 ; by Veidmann,  $12\frac{1}{2}$  times out of 100, and I have collected a number of cases, making my proportion  $18\frac{3}{10}$  out of 100.

*Dangers caused by Loopings of the Cord*.—Independent of all the dangers already noted *à propos* of short cord, we may mention interruption of the foeto-placental circulation, which brings about asphyxia, and, in rarer cases, strangling at the moment when the trunk is expelled. When the head frees the vulva it is retained in this orifice by the loops which tighten about it, and if a uterine contraction follows the trunk may be expelled or the tension which results may strangle the child, which at that moment often begins attempts to breathe. The first cause of death is the more frequent ; *i.e.*, the arrested circulation in the omphalo-placental vessels, which Gardien was the first to describe. Velpeau scarcely admits that this may be a cause of death, but Monod, Taxil, and Hillairet have reported cases which prove that loops may be so tight that they leave deep marks in the parts around which they turn.

In Taxil's case the neck has been reduced to  $\frac{4}{5}$  in. in diameter. These cases, though rare, do not the less demonstrate the possibility of compression of the jugulars and carotids, even within the uterine cavity before the membranes are ruptured. Besides, the two causes may be acting at the same time. Yet most often death of the foetus occurs during labor and delivery, and is due to flattening of the loops of the cord, whereby the

blood-current is arrested. This flattening may be induced by uterine contractions when the cord passes around the back, or around the foetal part which is accessible to direct uterine contraction, or when the foetus, pushed forward by uterine contraction, is dragged back by tension of the cord; the succession of these movements is followed by increasing constriction of the loops. But in the vast majority of cases the child is born suffering from partial asphyxia due to impeded circulation.

Chantreuil and Charpentier report numerous cases where curious alterations of the foetus have been brought about by loops around the neck, trunk, or extremities of the child, and have induced atrophy or amputation thereof. The same may be said of knots, whether the pregnancy be simple or multiple.

*Symptoms.*—Along with the symptoms already given for short cord we may add that when the head is delivered, by passing the finger around the neck of the foetus we can determine the presence of loops and the degree of their tension. The sensation of twisting and pulling is very painful for the mother when such loops exist.

*Indications for Treatment.*—We may add to the suggestions already given for short cord the precaution of unrolling the loops and passing them above the head of the foetus; and some authors say when the head is still in the pelvis, that this manœuvre should be executed. The latter attempt would be impossible, unless the head were extremely small. When the head has come out of the vulva, either naturally or by means of the forceps, we may try the above manœuvre, and in case of very tense constrictions hasten to cut the cord, whose two extremities should be held with a forceps so as to avoid hemorrhage; then hasten to extract the trunk. The same conduct should be observed with breech presentations and a short cord. In delivery we must guard against uterine invagination also, which may occur.

2. *Knotted Cord.*—Active movements of the foetus may produce knots in a long cord, which may thereby be reduced to an abnormally short one. True, these knots, when they exist, rarely shorten the cord so as to create an obstacle to labor, but the knots may compress the umbilical vessels and cause death from asphyxia, even within the uterine cavity. These knots, which may occur at two or three points along the same cord, are not, however, necessarily fatal to the life of the foetus (Baudelocque), for it is very rare that they are tight enough to interrupt the circulation before labor; but the cases which science records make it very clear that this accident occurs during labor and delivery. At my clinic, July 31, 1865, a living child was born with a cord 50 ctm. (20 in.) long having three distinct knots upon it.

The symptoms and the treatment are identical with those of a normal short cord.

Velpeau describes varicose cords, which, we think, only cause harmless



intra-amniotic hemorrhage in case of rupture of the varices. (See Chan-treuil's work, Paris, 1875, and Charpentier, loc. cit.)

3. *Prolapse of the Cord*.—Prolapse or procidentia is an accident that occurs usually with a long cord. Prolapse of the cord into the vagina and out into the external world is favored by a shoulder presentation, deformed pelvis, and insertion of the placenta in the inferior segment of the womb; in other words, whenever the umbilicus approaches the orifice, or when there is a faulty adaptation between this orifice and the foetus. Quite often prolapse of the cord is accompanied by procidentia of a limb, which, so to speak, opens the way for it.

Generally it is at the moment of rupture of the membranes that the flow of liquor amnii sweeps a loop of the funis down into the vagina, and hence excess of liquor amnii is a cause of procidentia.

Michaelis found it  $2\frac{7}{10}$  times out of 100, but Churchill only once out of 282 cases. I met with it once when the cord was 90 ctm. long (36 in.), it being the second time that the woman had suffered prolapse of the cord.

In two other cases the cord was 1 m. 10 ctm. (40 in.) and 60 ctm. (24 in.) long respectively; but in the latter cases the trunk presented. Statistics given by Soyre are found in Depaul's "Clinical Lectures;" he gives 278 cases taken from the clinic of the *Faculté de Médecine*.

*Symptoms*.—Symptoms of prolapse of the funis before rupture of the membranes are often difficult to make out. Underneath the part that presents we feel a sort of soft bulbous mass, which is the flaccid cord, slipping beneath the finger and beating from arterial pulsation, provided the child is alive. These pulsations are especially noticeable in the interval between the pains, and by means of the mother's pulse we can make out that they are not induced by pulsation of uterine arteries. These symptoms are, however, obscure, and oftentimes there are many causes of error.

After rupture of the membranes the cord in the vagina or in the vulva is easily discovered, and we may thus readily find out whether the foetus is alive or dead; still, the circulation may not be completely arrested and the cord may not pulsate so that we can feel it. But if with absence of pulsations for *some time* the cord should be cold, greenish, and soft, there is no doubt that the child is dead. Besides, we may have recourse to auscultation to confirm the latter symptoms, which, by the by, Cazeaux and Joulin do not recognize. Tarnier says that uterine contraction may induce reflux of blood from the placenta to the vessels of the cord, and that this may produce false pulsations even when the foetus is dead. We must know whether the foetus is alive or dead, for the sake of treatment.

*Prognosis*.—This accident is wholly without danger to the mother, but is very dangerous for the child, who often dies from compression which the cord suffers, unless we hasten to put the latter back. But should the membranes be intact there is little to fear, since the liquor amnii prevents



compression of the cord. This compression, moreover, is always less than that which loops of the cord suffer, and we know that the latter rarely kill the child before labor. Jacquemier and Cazeaux, however, are of an opposite opinion. Joulin's statistics give the proportion of 60 deaths in 100 children where there was prolapse of the cord. Compression is less to be feared when the cord is in relation to soft parts, toward the sacro-iliac synchondrosis, for example; this, moreover, is its usual situation. Chilling of the cord has but a very slight influence upon the arrest of circulation within the vessels. (See Soyre's work, already quoted.)

*Treatment.*—If prolapse is discovered before rupture of the membranes, try to preserve the latter intact as long as possible, and put the woman in such a position that the head is lower than the pelvis. If the child is dead and the bag of waters is ruptured, let labor proceed; but if it is living we must reduce the prolapse so as to avoid compression of the cord. In order to effect this do what has already been advised for reduction of prolapsed limbs, *i.e.*, with the hand push the cord into the uterus above the foetal head during the interval between the pains, and hold it there until a new contraction engages the head; then take the hand out quickly. Sometimes we are obliged to do this several times, for every time the cord is put back it will slip out. Formerly, obstetricians advised us to hang the cord around the feet of the foetus, which is scarcely practicable, and, besides, useless; but to push the umbilical cord up to the fundus is good treatment; for if we succeed procidentia is far less liable to recur. To use the hand is difficult, and the dilatation which the hand brings about predisposes to another prolapse. If we penetrate to the fundus uteri it will be more simple, after having pushed up the loop of the cord without hanging it around the foot, to deliver the child by means of podalic version. We know that in breech presentation prolapse of the cord does not at all complicate the prognosis. Besides, in presentations of the shoulder, which are often accomplished by prolapse of the cord, all authorities agree to perform version after reduction.

But it will be preferable in vertex presentations—especially if the cervix has not yet completely dilated, and reduction of the cord above the head cannot be maintained—to carry the loop of the cord up to the fundus of the womb and leave it there when the first contraction begins, not performing the manœuvre with the hand. A great number of instruments have been invented for this operation; they have been called "*remontoirs*," "*repoussoirs*" (punches), and "*porte-cordons*." Some are shaped like two-tined forks; others, made according to the indications already given, of two blades which glide one upon the other, their extremities forming a ring when approximated, and which can enclose within it the cord without compressing it in the least. Hubert (of Luvain) and Wasseige (of Liege) have each invented a special instrument for reduction of the cord. "*Repoussoirs*," like "*porte-nœuds*," pelvimeters, etc., are very numerous, and

the physician is often embarrassed in his choice ; the simplest are always the best. The one that Depaul recommends may be made by a physician at the moment when it is necessary to use it, should he be far from home. It consists of a little stick of wood, split at its extremities so as to form a fork whose tines are sufficiently spread apart to enclose the cord. The chief merit consists in its ease of manufacture.

Dudan has proposed even a simpler method to reduce the cord. A gum catheter, a stylet, and a piece of string are all that is necessary. Pass the string through the eye of the catheter and push the stylet up to its end ; this presses on the string and holds it within the sound. Then take the loop of the cord which is tied to the sound by the string, and after having pushed the cord up to the fundus uteri (during an interval between the pains) wait for a contraction and then quickly withdraw the stylet ; subsequently take out the sound, and the head will then engage so that the cord can no longer slip out, the string remaining on the cord within the uterine cavity.

This somewhat celebrated method is regarded in different lights. Certain it is that the cord must be far out in order that it can be tied to the string. When the cord is thus prolapsed there is a large loop which is slippery and heavy ; the sound is apt to bend, and a new loop slips out before reduction can be effected. I cannot better compare what occurs in this case than by recalling intestinal hernia through a wound in the abdominal walls—when we reduce one loop of intestine another slips out because of the immense mobility of the mass of intestine. It is the same with the cord, for let us not forget that prolapse of the cord nearly always coincides with extreme length. I have described this difficulty because I have personally met with it.

In the case referred to a deformed pelvis—8 ctm. ( $3\frac{1}{2}$  in.)—complicated the situation. I ended labor by the forceps ; the child being dead. The cord was 90 ctm. (36 in.) long. Prolapse had occurred with this woman during a former pregnancy. The physician who had the case was most capable, but believing that he had to perform version on account of the deformed pelvis, the fœtus was still-born.

Here I may mention an excellent precaution given by Prof. Robert Barnes in his "Lectures on Obstetrical Operations." Whatever method we employ we must place the woman on her knees, with the trunk flexed and her hands upon the bed vulgarly speaking, "on all fours."

In this position the fundus uteri is on a much lower plane than the os, as would occur in large ruminants, for instance. Bringing the cord up to the internal os often suffices for its reduction, just as if the obstetrician should himself carry the cord by means of an instrument up to the fundus. After a contraction we are sure, in this case, that the cord will be definitely retained.

Whatever method be employed for reduction, if all our attempts are

unsuccessful, and uterine contractions announce a near termination, protect the cord as much as possible from cold and compression ; that is, hold it in the vagina, pushing it back toward one of the sacro-iliac synchondroses. If, on the other hand, labor is tedious and the foetus is probably in danger, which will be evidenced by the umbilical circulation, apply forceps immediately and end labor, taking care not to inclose the cord in the blades of the instrument.

#### ART. IV.—DIFFICULTIES AND COMPLICATIONS OF DELIVERY.

The foetus has passed the maternal soft parts, but the labor is not terminated until the placenta is delivered. Hence, many consider difficulties and complications of delivery along with causes of dystocia. We prefer to make a special chapter, and we shall make six paragraphs, as follows :

1. Adhesions of the placenta.
2. Hour-glass contraction, bulky placenta, and rupture of the cord.
3. Retention of the placenta.
4. Invagination and prolapse of the uterus.
5. Rupture of the perineum, and fistulæ occurring subsequent to delivery.
6. Hemorrhage from inertia uteri.

§ 1. ADHESIONS OF THE PLACENTA.—Abnormal adhesion is very rare and authors do not agree upon its cause. Joulin says it is a simple exaggeration of the physiological state. Puech (of Nîmes) regards it as the result of an inflammation of the uterus and its envelopes, occurring either before or during pregnancy, but the same author admits that, though uterine inflammation exists, adhesion does not necessarily follow.

This form of dystocia is quite frequent after abortion ; I have met with it several times and treated it with more or less success. The slight muscular development of the womb suffices here to explain the cause.

After delivery of the child, the attachments which bind the placenta to the womb, instead of rupturing as ordinarily occurs, persist for a considerable time, either completely or partially, and then this organ, instead of being spontaneously expelled, or expelled after simple traction, remains within the womb and sometimes resists the most energetic efforts made upon it.

*Diagnosis.*—When a certain time has passed after delivery and the placenta has not been expelled, we should find out the state of contraction of the womb by abdominal palpation. If, by means of touch, we find that the cervix is still dilated and the placenta cannot be felt resting upon the internal os, we may suspect abnormal adhesion. Several hours could elapse before this could be taken as evidence, for sometimes the placenta is not normally detached for one or two hours. Cazeaux gives as a symptom of adhesion tension of the umbilical cord felt upon traction and



slipping back of the cord as soon as we relax on the pull. But a certain sign of adhesion is discovered by introducing the hand into the womb and following the umbilical cord. In cases of incomplete adhesion there is more or less hemorrhage from the vulva; nothing like this occurs when the placenta is completely adherent to the uterine surface. Still, a central detachment of the placenta may occur with adhesion all around the periphery. In this case intra-placental hemorrhage may occur, only indicated by the general condition of the mother.

*Treatment.*—In all cases of adhesion that are not complicated by hemorrhage we must wait before interfering. If the physician is pressed for time he may go upon his visits, leaving an experienced nurse with the patient, and this is by far preferable to hasty interference. Yet delay ought not to pass certain limits, for the cervix closes, and the placenta, being in free communication with the external air, putrefies, and thus the woman is in great danger. Beek tells us that in 35 cases where the placenta was left in the uterus the mother died in 30, while out of 163 cases of artificial delivery death occurred in but 6; Blumhart and Rieck, in 32 cases where the placenta was left in, found death to occur in 29, and in 568 cases where it was delivered artificially, death occurred only in 62 cases. Hence the physician should return from time to time to find out the condition of his patient; but after having waited twenty-four or thirty-six hours at the most, especially if a fetid flow occurs from the vulva, we must interfere, and we must interfere immediately should adhesion be complicated by hemorrhage.

[We do not favor delay such as has been mentioned. Separation and removal of the placenta would not be made an easier operation by waiting, and the period of delay would be replete with dangers of hemorrhage, of excitement to the patient, and of putrefication of the placenta.—Ed.]

Traction on the cord and injections of cold water into the umbilical vein are the first means to be employed. The latter acts in two ways: (1) by distending the vessels and increasing the weight of the placenta, which then is more easily detached, and (2) by favoring rupture of placental detachments by inducing a sensation of cold. Some say that these injections, augmenting the size of the placenta and increasing its weight, render its exit more difficult from the cervix. This objection cannot be made unless the cervix has closed, and indeed, after detachment of the adhesions, we may always diminish the volume of the placenta by taking off the ligature placed at the extremity of the cord to retain the injection within the vessels, should we have practised such injection. We have stated in the article upon "Treatment of Mother after Delivery" that many obstetricians put two ligatures upon the cord, in order to facilitate detachment of the placenta.

When these means fail do not fear to carry the hand into the uterine cavity, and if one border of the placenta is detached grasp this and de-



tach the placenta by slight tractions and by separating it with the extremities of the fingers, which should always be carried as *near as possible* to the internal surface of the uterus. It is much better, however, to leave a little placental *débris* within the womb than to risk perforation of this organ, an event that sometimes attends. Proper treatment will finally prevent the evil effects of putrid absorption, and, besides, the uterus may later on expel the small portion of placenta which has been left in its cavity.

Extraction is much more difficult when complete adhesion is present. We must try to penetrate behind the membranes with the hand and detach a portion of the placenta, then proceeding as in the former case. If a central hemorrhage has detached the middle of the placenta, we may perforate (as Leroux did in one case) the central portion of the placenta and then detach from the centre toward the periphery. Finally, if all these means fail we have to rely on nature to expel all the placenta or those portions that remain within the uterine cavity. Observe closely until the membranes are completely expelled.

§ 2. "HOUR-GLASS" CONTRACTION, BULKY PLACENTA, AND RUPTURE OF THE CORD.—Sometimes the placenta is detached, and yet traction upon the cord does not succeed in extracting it. Then palpation discovers an irregular form of the womb, and the finger carried into the cavity, following up the umbilical cord, comes to a portion of the uterus which is spasmodically contracted and retains beyond it the detached placenta; this is "hour-glass" contraction. The placenta is, as *Peu* says, contained in a sort of "back room," whence it cannot be extracted. *Prof. Depaul* thinks that spasmodic contraction occurs at the internal orifice; this is *Guillemot's* hour-glass contraction. Both varieties exist, but the latter is the more frequent (*Barnes*); moreover, they both may exist with abnormal adhesion which we have just described; again, the placenta may be detached, and part may be behind and part in front of the contracted spot.

*Treatment.*—Hour-glass contraction, like spasmodic contraction of the internal os, demands the same treatment as the latter. As long as no danger exists we must wait; and after a few hours the uterus will usually regain its normal form and the placenta will be expelled.

But if, after waiting five or six hours, the condition of the womb remains unchanged, we may have recourse to bleeding should there be plethora, and injections of laudanum and water to combat irregular contractions. [The production of emesis may be useful.—*Ed.*]

These means may fail, however, and then if the placenta is held within the contracted portion, try to pull it out and to extract it intact; if it be behind, try progressive dilatation of the constriction by means of the fingers introduced one by one, having previously dipped them in belladonna cerate. (*Stoltz*.) During this manœuvre the free hand should embrace the fundus uteri and hold it firmly in position. After vanquishing the uterine

spasm, of course if the placenta is adherent we must act as has been already indicated for abnormal adhesion ; but, as a general rule, cessation of the spasm is followed by detachment of the placenta.

Dubroca (of Bordeaux) advocates a method which he calls *erosion*, in which the placenta is dislodged by the finger carried beyond the contraction. In several cases I have met with genuine hour-glass contractions. I will cite but one (reported in the *Gazette Obstetricale*, Nos. 5 and 6, 1872), where the placenta was partly adherent in the womb and partly engaged in the infundibulum of the right Fallopian tube, which was dilated like the end of a trumpet, and which contracted upon the placenta.

Probably the cause of this abnormality was the orbicular arrangement of the muscular fasciculi of the uterus about the orifice of the tube.

Ergot, which had been given by the midwife in this case, could not be blamed for the contraction when we think of the anatomical disposition that I have just referred to. Opium, given to combat this encystment, was followed by hemorrhage. After having freed the uterus of the clots that it contained I was able to make out the situation, and with the hand alone to overcome resistance of the tube and to penetrate deeply in the latter so as to extract the placenta and bring it into the uterus, from which I removed it totally. The womb, freed from the placenta, contracted normally, the hemorrhage ceased, and the woman was saved.

In hour-glass contraction ergot is contra-indicated ; and not without reason have several authors attributed to its administration the production of such spasmodic contractions. Injections of belladonna and hyoscyamus decoctions have been markedly successful in Stoltz's hands. The whole list of antispasmodics may be employed in these cases.

*Abnormal size of the after-birth*, due as a rule to accumulation of coagulated blood in the membranes, may be caused by retention of the placenta above the cervix. The finger, carried to the orifice, discovers that the latter is not contracted and that it is the size of the placenta which causes its stay in the uterine cavity. Then if traction does not succeed in extracting it, or if section of the placental end of the cord to relieve the vessel is not successful, remove it with the hand—an operation presenting no difficulty.

In all these operations the cord is necessarily twisted. Should it rupture—which may occur when it is weak, the fracture being located at its insertion with the membranes—push the free end into the vagina so as to avoid the malevolent gossip of the old women, and detach it and deliver it with the hand.

Joulin advises us to perforate the placenta in these cases by means of the finger, so that we may have something to seize upon when the placenta falls over the os internum.

§ 3. RETAINED PLACENTA.—All the efforts that we have made may be futile, and the placenta may be wholly retained within the womb ; or, after having delivered a portion of the placenta, the obstetrician may see the

necessity of leaving the remainder within the uterine cavity. Then it will nearly always be easy, from inspection of the portions that have been delivered, to appreciate how much has been left in the womb.

The *symptoms* which follow retention of all, or part of the placenta are those of hemorrhage, putrid absorption, and sometimes peritonitis. In rare cases no symptoms have followed, complete absorption of the placenta taking place. A few words are necessary upon each of these complications.

*Hemorrhage.*—Whenever a foreign body remains in the uterine cavity after delivery it induces contractions of this organ, which are accompanied by more or less abundant hemorrhage according to the size of the foreign body. Now, the placenta, or a part of a placenta which has been detached from the uterine wall, is a foreign body, and as such it induces hemorrhage. The same is true of membranes. The maternal vessels which were in communication with the placenta are not hermetically closed when contraction is incomplete. Sometimes the retention of the placenta within the womb does not cause hemorrhage, because the uterus contracts, or portions of the after-birth are still adherent. Hemorrhage, when it is slight, will cease spontaneously; but it may reappear after its cessation and persist for several days; then it finally stops, and the lochia, which up to this time have been purely blood, become fetid, and mingle with the sanious and fetid fluids.

*Putrid Absorption.*—Changes in the lochia are results of putrefaction of that part of the placenta which remains within the womb. Sometimes, however, after a complete delivery the lochia may be fetid, either because of the bad general condition of the woman or from contaminated atmosphere, which has an influence upon the decomposition of a uterine wounded surface, or because of a clot which has been formed on account of secondary hemorrhage.

In these cases putrefaction is due to the entrance of air; any part of the detached placenta which is in the uterine cavity undergoing decomposition when exposed to the air and the general health of the woman soon becoming impaired. Then follow chills, fever, frequent respiration, restlessness, dry tongue, and sometimes peritonitis, with tympanitic distention of the abdomen; hypogastric sensibility is increased, vomiting occurs, and frequent and involuntary discharges from the bowels follow. Finally there is delirium, a feeble and intermittent pulse, great weakness, and restlessness, all of which are symptoms characteristic of putrid absorption, from which the woman soon dies. Should peritonitis not occur the prognosis is far less grave; yet the woman may die from simple septicæmia.

The *treatment* of putrid absorption consists in great cleanliness, fresh air, and repeated uterine injections, consisting of 2 grms. (gr. xxx.) of carbolic acid in 1,000 grms. (2½ lbs.) of water, 10 grms. of permanganate of potash (gr. clv.) in 1,000 grms. (2½ lbs.) of water, or water slightly chlorinated, or



even simple infusions of chamomile and tepid water. These injections are all to be given by means of a double-barrelled catheter. Sulphate of quinine should then be given, 50 ctgrm. or 1 grm. (gr. viii.-xv.) in twenty-four hours. Some physicians also give aconite along with the quinine, but we prefer carbolic acid internally (ten drops morning and evening in a glass of sweetened water) to either quinine or aconite, whose efficacy is far from being proven.

After a few days of this treatment, and especially under the influence of the injections, the flow loses its fetor and becomes simply purulent. Every injection is followed by exit of pieces of the placenta, sometimes a large portion and even all of the placenta that has been retained within the uterine cavity. According to circumstances, the woman quickly or slowly regains perfect health.

Following abortions, and, more rarely, normal delivery, the placenta remains, wholly or in part, for several days, several weeks, or several months within the uterine cavity, without inducing any symptoms whatever; then hemorrhage suddenly occurs and the placenta is expelled without bearing any traces of alteration, the integrity of its vascular connections having maintained its vitality. Such a case is known as "*tardy expulsion*" of the placenta. With Depaul, I saw a case in which, after abortion at the eleventh week, the placenta remained three weeks within the uterine cavity; the woman had had several hemorrhages meanwhile, and these had induced considerable anæmia.

Pajot relates the case of a woman who after abortion retained the placenta within the womb for five months, after which it was expelled. No symptom was induced. As to cases of complete absorption of the placenta, without absolutely denying the possibility of them, we may say that most of the cases published ought to be considered as instances of incomplete placenta, or else the cases followed abortions where pregnancy was only slightly advanced.

*Treatment of Retained Placenta.*—We have little to add to what has already been said. If after careful traction with the hand the portion of the placenta that remains cannot be extracted, and if injections are followed by expulsion of large pieces of placenta, it is well to extract these pieces that present at the cervix, either with the fingers or by means of a forceps, and, if necessary, proceed as in cases of retention following abortion, that is to say, with Pajot's curette scrape the internal surface of the womb to facilitate the detachment of the adherent placenta. Then give purgatives, and if there be any signs of peritonitis, mercurial friction. Finally, the forces should be maintained by quinine, wine, etc., should there be symptoms of anæmia.

§ 4. INVAGINATION OF THE WOMB; PROLAPSE OF THE WOMB.—In cases of adhesion such as we have just described, traction on the cord may, when the latter follows the hand, make us believe we are extracting the



placenta, yet these adhesions may persist and the fundus of the womb may be pulled down toward the cervix and come out of the vulva still united to the placenta.

Such an event cannot happen if the precautions given in the article on "Delivery" are followed. Indeed, if the free hand, or that of a capable assistant, is applied to the fundus of the uterus, it will feel the superior portion of that organ becoming depressed in a funnel-shaped manner in proportion as we pull upon the cord. (See the thesis of Budin, page 104, Paris, 1878.)

This dangerous condition may also follow too rapid delivery if the cord is short or if there are loops around any portion of the foetus.

When the womb is thus invaginated, its presence in the vagina establishes the diagnosis. In complete invagination the internal surface of the womb becomes its external surface, and the organ hangs between the woman's legs, often still covered by the attached placenta. Soon the cervix retracts and reduction is most difficult. This difficulty, along with the danger of grave hemorrhage when the placenta is detached, makes the prognosis very bad; but if invagination is reduced by simple pressure on the inverted fundus of the womb, which has entered the cervix without passing through it, the prognosis is not bad. Regarding those cases in which the womb appears at the vulva the prognosis is rather serious, for this accident is always accompanied by constitutional symptoms which are more marked the nearer invagination is complete; and in addition to intense pain the woman faints, and her pulse becomes feeble, rapid, and perhaps intermittent.

*Treatment.*—When the physician perceives a funnel-shaped depression upon the fundus uteri during delivery he must cease all traction. If the placenta is partly detached he must introduce the hand into the genitals and reduce the invagination and complete the separation of the adhesions so as to force the uterus to contract—the only method of arresting hemorrhage which accompanies partial detachment. But if the placenta is still adherent he must reduce the placenta along with the womb, and not first detach it, for fear of fatal hemorrhage. Then wait for spontaneous expulsion by exciting the womb to contract. Finally, in cases of complete or nearly complete invagination reduce the whole mass together as quickly as possible, so as to avoid hemorrhage. If the placenta should be half detached, complete its separation and then reduce the womb and encourage contractions by every possible means.

Every moment lost after a few hours exposes us to the danger of contraction of the cervix, which then creates an insuperable obstacle to reduction. Before proceeding to this operation we should apply emollients to the parts, give a warm bath to the woman, and rub the abdomen with belladonna cerate; opium and chloroform may also be employed. Then with the hand placed in the form of a cone and well greased, or better

still, covered by a piece of linen, try to make the fundus of the uterus pass little by little into its orifice, so as to force it into its normal position; leave this hand in the womb for some time, so as to prevent reinvasion and facilitate contractions.

It is evident that if the cervix does not permit reduction of the placenta we must detach it before proceeding to reduce the fundus uteri.

[Attention to the prostration of shock and hemorrhage must be bestowed.—ED.]

I shall say very little concerning *prolapse of the womb* occurring during labor. Most women fear this complication. We know that it is favored by a large pelvis, by multiple pregnancies, and by violent uterine contractions, especially should there be any obstacle to dilatation of the cervix. When speaking of deformed pelves that were abnormally large, we have said that these women must be put to bed very early to facilitate dilatation of the cervix, and to combat precipitate expulsion of the fœtus.

If, finally, prolapse of the womb occurs, no matter to what extent, we must immediately reduce it and order the woman to remain a long time in bed after delivery, and give laxatives, so that she may never strain during defecation. This rule should also be followed after reduction of an invagination.

We know that women who suffered from prolapse of the womb before pregnancy have been cured by following these rules after parturition.

§ 5. RUPTURE OF THE PERINEUM AND FISTULÆ FOLLOWING DELIVERY; PERINEORRHAPHY.—When the precautions that we have already given to prevent rupture of the perineum have not been followed, a rupture may occur either from prolonged sojourn of the fœtal head upon the soft parts during parturition, from too rapid expulsion of the head on account of energetic uterine contractions (either normal or induced), or, finally, from applying the forceps or from spontaneous delivery of an occipito-posterior position that has not been reduced.

The *former* case—prolonged stay of the head upon the soft parts—is followed rather by recto- or vesico-vaginal fistulæ than by rupture properly so called; still, as we shall see further on, a fistula may extend far enough to involve rupture of all or part of the perineum, or necessitate its complete rupture by the surgeon. This is especially the case when, with inertia uteri, the inferior strait of the pelvis is narrow; in this instance, fistulæ around the genital region are very commonly met with.

The *second* case is much rarer than we should suppose; still I have seen several examples, some of which were due to injudicious administration of ergot.

In the *third* instance the perineum may split all the way from above downward, constituting what surgeons call “complete rupture of the perineum,” in which the recto-vaginal septum is nearly always more or less extensively torn. This results either from spontaneous delivery in an oc-

cipito-sacral position, from application of the forceps made contrary to the rules already given, or from both of these causes combined, and sometimes from application of the forceps made most carefully by an experienced hand.

Besides this, and due to the same causes, there are slight ruptures, which only demand a few sutures, or even simple approximation of the thighs, following a stretching of the vulva in primiparæ from passage of the head, shoulders, etc. In these cases the recto-vaginal septum is never torn, and the sphincter ani is more or less intact. These we shall not consider, but only those lesions which may demand an operation designated at the present day as *perineorrhaphy*. Given, then, the necessity of perineorrhaphy from any of the above-named causes, when should we perform this operation, and what method should we employ in its performance?

1. *When should we perform the operation?* Verneuil has largely contributed to do away with the fear that obstetricians felt concerning operations performed during the puerperal period. Hence, we may say that if he is called early the surgeon should attempt immediate union. In this case we have the great advantage of joining healthy surfaces, and thus there is no necessity to pare the wound.

If at the end of a few days union by first intention does not occur, we may still risk the chances of an approximation, even when the edges of the wound granulate and simple rubbing suffices to coaptate the lips, always provided cicatricial tissue has not formed.

But when the surgeon is forced to pare the wound before proceeding to a methodical operation, postpone the operation until after the lochia cease to flow, and this is a rule that a prudent surgeon will never violate.

2. *What method shall we employ?* Here the choice is very embarrassing.

After Trotula, who in the middle ages advocated restoration of the perineum, Roux and Dieffenbach have avowed their preference for this operation.

Langenbeck perfected Dieffenbach's operation, and many of his students have modified his method, which we may say has become classical. I have only to mention the names of Freind, Simon, Heppner, and Hildebrandt, to indicate the different stages that Langenbeck's method has passed through during recent years.

But we shall leave all these methods and all these procedures to discuss *one operation*—Dr. Pean's. There are only two stages to this operation, as in Dieffenbach's; it demands neither the formation of a layer of new tissue, neither the division of a septum, neither the necessity of any sutures, independent of those of the two raw surfaces. This very simplicity does away with all chances of complication, and allows the most modest surgeon to operate in any case.

We can give a *résumé* of it in two words: *paring and sutures*. Of



course the success of the operation will be assured by subsequent careful treatment.

We refer the reader to the second volume of Dr. Pean's "*Leçons Cliniques*," page 275, and to the *Médecin Praticien*, page 5, 1883.

In this operation there is no after-wrinkling, and no fold that may form a pouch for the retention of septic matter; hence the operation is eminently proper. The constipation that Pean induces subsequently does away with all chances of infiltration which might occur in or about the wound and prejudice final union.

In the future obstetricians should be exonerated from certain cases of rupture of the perineum or recto-vaginal fistulæ, whose principal cause, due to narrowness of the inferior strait, has never until now been considered by authors who have written upon the art of obstetrics, and who content themselves with naming the prolonged stay of the head within the pelvis as a cause of these fistulæ. Application of the forceps, which is generally indicated, demands in cases of a narrowed inferior strait a dexterity of hand that is seldom met with.

Ergot, even in multiparæ, would be followed in these cases by the most deplorable results.

§ 6. POST-PARTUM HEMORRHAGE.—We have described feeble contractions and the treatment which such demand. Contractions generally grow feeble during labor at the end of the first or beginning of the second stage. But a more dreaded inertia may follow expulsion of the fœtus. This has for its results the immediate induction of hemorrhage, which may become fatal in a short time. This paragraph completes the chapter on hemorrhages by treating of those hemorrhages which may occur after parturition.

*Causes.*—We shall study *predisposing* and *exciting* causes of post-partum hemorrhage. The former are: a sanguine temperament, abundant menstruation, weakness of constitution, and especially muscular weakness, and finally previous profuse hemorrhage. The *exciting* causes are long and painful labor that has exhausted the woman's forces, or, on the other hand, a very rapid labor which is followed by a sort of "stupor of the uterus" that prevents its normal contractions. Obstetrical operations, version especially, induce too rapid emptying of the uterus. Finally, any distention of the uterus, as from twin pregnancy, dropsy of the amnion, etc., paralyzes the organ and induces hemorrhage from inertia.

*Mechanism of Production.*—After expulsion of the fœtus, the uterus contracts, returns upon itself, so to speak, and the capacity of the organ diminishes, the median muscular layer, whose arciform fibres surround the uterine vessels, ramifying in its depths, constricts these vessels, obliterating their cavity. The circulation being thus interrupted, those vessels, torn because of detachment of the placenta, are, in the physiological state, prevented from giving exit to any blood.



But if one of the causes that we have named is present, contractility of the tissue may be very feeble, and sometimes wholly absent. In the former instance the inertia will be incomplete; in the latter it will be complete. Then closing of the vessels will not occur, and they will remain open at the spot where the placenta was attached, and hence more or less hemorrhage will follow. In cases of complete inertia the effects may be terrible. In order to produce it the placenta must be detached partially or wholly, for if all the placental adhesions are preserved, blood cannot flow from the vessels. Uterine contraction often begins after exit of the liquor amnii, and the womb gradually contracts upon the fœtus, commencing during labor to detach the placenta, and to close up sources of hemorrhage.

Sometimes previous to inertia the placenta has fallen over the cervix, completely covering it. This is a dangerous complication, for the blood can no longer flow out into the external world, and hence accumulates in the dilatable uterine cavity, distending it anew and inducing what is called *internal* or *concealed* hemorrhage, which may be so extensive as to kill the woman before the physician is aware of the danger. The same result has been caused by clots, or by contraction of the lower segment of the womb, coincident with inertia of the fundus. The latter cause of internal hemorrhage does not seem to me demonstrable, and the feeble resistance of the orifice after delivery renders it a statement hard to credit. Cazeaux describes the position that the woman often assumes to arrest external hemorrhage (*viz.*: elevation of the pelvis) as being at times a cause of concealed or *internal* hemorrhage.

*Symptoms and Diagnosis.*—After what we have just stated inertia is readily recognized. We can feel in the abdomen a large, insensible, soft tumor instead of the hard ball that we usually meet with in normal cases; if inertia is complete it will be very difficult to distinguish the uterus from the abdominal walls.

Under these circumstances, if the placenta is still adherent, there will be no hemorrhage; but if the placenta is wholly or partly detached, hemorrhage will inevitably occur.

We have stated that hemorrhage may be internal or external; as a rule it is mixed, *i.e.*, blood flows out into the external world at the same time that it accumulates within the womb. (Joulin.)

In internal hemorrhage the blood accumulates in the uterine cavity, whose walls are very readily distended. The hand upon the abdomen feels a large, distended uterus, which sometimes rises as high as any point reached during labor. At the same time general symptoms of grave hemorrhage become manifest. The woman suffers from vague pains and cramps in the stomach; there is pallor of the face and of the mucous membranes; she faints; chills occur; the pulse becomes small, feeble, perhaps intermittent; syncope follows, and sometimes nervous manifestations, or even convulsions, close the scene.

Pains in the loins indicate the seat of the condition, and if the finger be carried into the vagina it will usually find the uterine orifice plugged by the placenta, or by a clot which is a bar to the exit of the blood. Extensive deviation of the orifice backward may also cause obstruction to the flow of blood.

In external hemorrhage the blood soaks the bed, runs through the mattress and forms pools on the floor. With these signs occur all those general phenomena that we have just named; as a rule the woman herself tells the physician of the symptom, so that we have time to treat the hemorrhage. Therefore, we may say that external is far less serious than internal hemorrhage.

In mixed hemorrhages we have all the symptoms belonging to both.

*Prognosis.*—The prognosis is grave in proportion to the loss, and in proportion to the time that has elapsed between the commencement of the flow and the arrival of the physician. We must also take into consideration the general condition of the mother. General constitutional symptoms of hemorrhage always indicate imminent danger.

*Treatment.*—Authors have divided treatment into *preventive* and *curative*. The former, in which we have confidence only in cases of marked plethora, consists in bleeding. During labor we must prevent a too rapid delivery, and hasten a tedious labor.

*Curative* treatment has for its object to check the hemorrhage as soon as it occurs. If labor has been precipitate leave the placenta in place when hemorrhage has not occurred; and if a long time has elapsed the placenta will probably be detached, and we must hasten to deliver it and excite the womb to contraction (Lachapelle). The latter method should always be followed in case of internal hemorrhage. On removing the obstacle to the flow of blood by introducing the hand into the womb, we transform internal into external hemorrhage at the same time that we rub the cervix with the fingers or excite the internal face of the uterus by the hand that is introduced therein; meanwhile, the other hand placed upon the hypogastrium must be used to produce friction and to compress the uterine walls. This is the surest and the quickest method to obtain the desired contraction.

When the hemorrhage is not so grave, and when it has not been considered necessary to introduce the hand, we can apply cold to the abdomen and upon the thighs, but *not* in the vagina or womb, as some advise. In all cases give ergot, which the physician should carry with him. In case of vomiting give ergot *per rectum*. [Or what is better, hypodermically.—Ed.]

While waiting for the effects of ergot, which may not manifest themselves within ten minutes or a quarter of an hour, continue all the means employed till its administration, and in addition insert a peeled lemon into the womb, after having run a string through it so that we may with-

draw it at pleasure. Formerly intra-uterine injections of vinegar or lime-water were employed, but they may advantageously be replaced by the insertion into the uterine cavity of a sponge soaked in some astringent. Acids thrown against the uterine walls induce contractions. Barnes, of London, strongly advises perchloride of iron as a styptic and coagulating agent, but all these means, which may induce inflammation of the organ, are not as valuable as direct excitation with the hands, which should always be preferred. The woman's position must always be horizontal, the head low, and the room full of fresh air.

If the woman has a marked tendency to syncope administer stimulants, bouillon (either by mouth or rectum), wines, rum, or cinnamon water; when the woman becomes cold apply heat to the thorax, extremities, etc. Should all these fail try to compress the abdominal aorta; this compression should be made through the abdominal walls—which must be relaxed—immediately above the fundus uteri and a little to the left of the vertebral column. In this place we can feel very readily the pulsations of the aorta.

Those who oppose compression of the aorta, among whom are Jacquemier and Depaul, say that the blood which is poured into the womb comes chiefly from the vena cava; but Cazeaux observes that compression of the vena cava is effected along with compression of the aorta, on account of the anatomical relation between the two vessels. The ovarian arteries, which are not compressed on account of their situation, supply only a very small quantity of blood to the womb, comparatively speaking.

During compression give ergot; and when the flow ceases continue to compress the aorta and the vena cava for several hours. Jacquemier does not administer ergot, which he believes to be useless in these cases. Compression of the abdominal walls by means of a very tight body-bandage may also be of service, and replace direct compression of the aorta after the latter has been continued for some time.

I shall mention tamponning after delivery only to advise its rejection. Among its dangers we may name that of transforming external into internal hemorrhage.

The final operation is transfusion of blood, which is only done in desperate cases. For this very reason, perhaps, there has been [in France] little success following transfusion; still, we must recollect it as a means of treatment, for Ameling, in England, and some other surgeons, have attained undoubted beneficial results from it.

If we are fortunate enough to save the woman, convalescence will be very long and tedious, for she is exposed to subsequent anæmia, and to puerperal fever, and to all those forms of paralysis which follow extensive hemorrhage. (Churchill.)

We shall end this part of the book by a final remark, viz.: A woman who has escaped the dangers of post-partum hemorrhage may still suffer

inertia a few hours or even a few days after delivery. Cazeaux calls this *secondary inertia*; to avoid confusion we prefer to call it tardy hemorrhage. It oftenest follows the presence of clots in the uterus, and sometimes a piece of placenta or a strip of membrane. Dr. Lizé (of Mans) has written an excellent article on post-puerperal tardy hemorrhages, published in the *Bulletin de Thérapeutique* (vol. 66, books 4 and 5). The physician must treat this the same as hemorrhage following immediately after delivery. Sometimes the woman loses blood after cessation of the lochia, because she gets up too soon, or is very much exhausted. This hemorrhage is never serious, and is checked by the horizontal position and small doses of ergot, which facilitate the return of the uterus to the size that it should assume after parturition.



## Part 5.

### MANŒUVRES AND OPERATIONS.

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IN Part 4 we have only indicated those cases which demand manœuvres or obstetrical operations. Here we shall give a complete description thereof. Following Dugès, we shall divide operations into three chapters.

1. Operations which leave intact the maternal and the foetal parts.
2. Operations which necessitate some solution of continuity of the foetal parts.
3. Operations in which there is some solution of continuity of the maternal organs.

## CHAPTER I.

### OPERATIONS WHICH LEAVE INTACT THE MATERNAL AND THE FŒTAL PARTS.

THESE operations being the most important, and most frequently performed, we shall enter into all their details.

We have the various applications of the hand constituting manœuvres, properly so called, such as version, tying tape, etc. ; then the use of the forceps, which play a most important part in obstetrics, and finally the lever and the crochet, which to-day are rarely employed.

#### TABLE OF OBSTETRICAL OPERATIONS.

BY DR. E. VERRIER.

1. Operations which leave intact the mother's and child's parts.	<p>Cephalic and podalic version, tying tape, reduction of procidentia, flexion of the head, straightening the head, etc. (manœuvres). Direct and oblique application of the forceps, of the leniceps, and of the retroceps ; use of graduated force in delivery (the "<i>aide forceps</i>" of Joulin, Chassagny, Tarnier, etc.). Use of the lever. The blunt hook.</p> <p>Artificially induced premature labor, the fœtus being viable.</p>
2. Operations which demand some solution of continuity of the fœtal parts.	<p>Embryotomy in all forms ; craniotomy ; simple cephalotripsy, or repeated cephalotripsy without traction ; cephalotomy (section with the saw-forceps) ; trepanning (Guyon) ; cranioclasm (Simpson) ; trebellation (Dugès) ; sphenotripsy (Hubert), and disarticulation of the bones of the skull.</p> <p>Embryotomy, properly so called ; decapitation ; de-truncation ; puncture of various kinds ; evisceration. Abortion.</p>
3. Operations which demand some solution of the maternal organs.	<p>Puncture, incision, gastrotomy, use of caustics, opening cysts.</p> <p>Symphyseotomy, vaginal hysterotomy, incision of the abdomen, and opening the peritoneal cavity.</p> <p>Gastro-hysterotomy, or Cæsarean section.</p> <p>Porro's operation. [Laparo-elytrotomy.—Ed.]</p>

We shall, in this chapter, also study premature artificial labor. Do we not purpose in this operation to preserve intact the organs of the mother and of the child? In this connection we may say that premature artificial labor, with the perfect methods that we possess to-day, is as justifiable an operation as it is important.

Before entering into the details of manœuvres and operations, the first article we shall devote to the use of chloroform in labor.

#### ARTICLE I.—ANÆSTHETICS IN OBSTETRICS.

Hardly was a knowledge obtained of the stupefying properties of ether and chloroform than Simpson, before all others, administered ether in a case of version, with marked deformity of the pelvis (1847). Soon Dubois and Stolz followed his example, and the benefit of anæsthetics was proven, and they were made part of obstetrical operations. Hence, this subject is properly treated of here, and we may say that chloroform has quite naturally succeeded ether in the general practitioner's choice.

Experience soon proved that the use of anæsthetics, while benumbing general sensibility, did not exercise the same influence upon the action of the womb, and that it left the abdominal muscles their contracting properties, provided too large a dose had not been given.

We should also observe that the uterus receives its nervous filaments from the sympathetic, and the abdominal muscles, in their capacity of respiratory aids accorded them by Longet, obtain their supply from the spinal cord; the integrity of action which the spinal cord preserves under the influence of anæsthetics naturally extends to all the muscular system of the abdomen which has to do with respiration.

Besides, the muscles of the perineum, which exclusively belong to the muscles of organic life, are relaxed by anæsthetics, and the perineum becomes a non-resistant aponeurosis, so that the head of the fœtus meets scarcely any obstacle upon its exit.

This is an important fact in connection with operations and manœuvres, since such a relaxation makes introduction of hands or instruments an easy matter.

Simpson wished to extend the benefit of anæsthetics to normal labor, and two years after the adoption of his method had 1,519 successful cases out of 1,519 labors! No one goes so far as he, and, as Professor Courty (of Montpellier, 1868) states, he gave chloroform in all cases, to the great satisfaction of his patients. He prolongs anæsthesia for several hours, and, if necessary, during the whole period of a painful labor, giving meanwhile a little wine to sustain the woman's forces; and every time she returns to sensibility, or appears to be on the point of returning, he makes her inspire chloroform anew, to prolong the anæsthetic period. From

England the use of chloroform in simple labors spread to America, where as little success was met with as upon the Continent.

In France chloroform has met with great opposition, yet Dr. Campbell has given us, at the request of his countrymen, a general rule for the use of anæsthetics. This distinguished obstetrician published in the *Journal de Thérapeutique* (Nos. 3 and 4, 1874) the result of his practice, showing no less than 942 cases where chloroform was used out of 1,500 labors. In Paris, apart from operations for which chloroform is generally used, anæsthetics are not employed at the clinic, except in very rare cases. Besides, there is great variation in the action of chloroform, according to the particular nature of each woman; but it is remarkable to see how few accidents there are, compared with what occurs in surgery. We know, besides, that chloroform, if it has not the advantages that have been attributed to it, has no harmful influence upon the health of either mother or child.

The best method of administration consists, as Nélaton says, in waving a handkerchief impregnated with the fluid under the patient's nose, the handkerchief being withdrawn from and placed close to the nose alternately as a contraction begins or ceases. This is the method adopted by Campbell and generally followed in England. (Courty.) Thus a large quantity of atmospheric air enters, with the anæsthetic vapor, into the respiratory tract, and we are always free to induce merely an incomplete muscular action and to prolong this state until the foetus is expelled. Blot has shown in his thesis that the stupefying action of chloroform is not so great in the second stage of labor, so that after the first inspirations we have no danger to fear.

Depaul calls attention to the fact that the woman who is stupefied cannot possibly "bear down," when asked to do so by the obstetrician, to aid contractions. But if accustomed to the use of chloroform, the obstetrician can leave the patient in the full possession of intelligence, and so can have her bear down at will, if he needs this action to aid in the termination of labor.

Dr. Campbell has, in the aforesaid article, thanked me for my defence of his methods; I have done more, I have formulated rules which have been published in various journals, and I give a *résumé* of them here; the existence of very great pain is generally part of labor in primiparæ; hence, I give the benefit of chloroform to all primiparæ in the second stage of natural labor, while, on the other hand, I forbid its use in multiparæ until an operation becomes necessary; for, as Depaul says, there are applications of the forceps so simple, that the introduction and placing of the blades may occur without the woman knowing it. In the latter case I do not begin inspirations of chloroform until the moment I begin to exert traction. In performing version, on the other hand, I give chloroform while introducing the hand and during turning, but only if the waters have long since flowed



away. In this way I can always more surely count on the aid of the woman during the period of expulsion.

[It is our belief that there is no obstetric operation which can be as well performed without, as with an anæsthetic. Chloroform obviates pain and disturbance to the nervous system, which otherwise would attend the most simple operation, and insures physical quiet at critical moments. It must be remembered always, however, that there have been deaths during chloroform administration, in labor, when no lesions could be found on autopsy. Every administration of chloroform should be regarded therefore as a serious matter, and the most approved methods should be followed.—Ed.]

Chloroform also renders immense service in other cases in obstetrics, such as eclampsia, etc., reference to which has been made in its proper place.

Things were in this condition when, following a lively discussion between Dr. Campbell and an eminent physician, the result of articles published by the former in favor of semi-anæsthesias in all natural labors, the following subject was given for the thesis of 1878: "The Comparative Action of Chloroform, Chloral, Opium, and Morphine upon Women in Labor."

The thesis was won by Dr. A. Pinard, who with all the talent for observation that he possesses, studied in 23 cases (21 of which were primiparæ), the action of chloroform upon contractility and retractility of the uterus, upon the muscles of the perineum, upon the progress of labor, upon circulation, respiration, temperature, etc., and finally upon psychical phenomena in women during normal labor.

In this clinical study, as complete as possible for the number of cases under observation, chloroform was given, now in fractional, now in very large doses. He obtained the following results:

"A. From the first inhalation, when the women were suffering in the interval between the pains, in all cases, whatever was the stage of labor, a sudden and perfect calm was observed; but quite severe pain occurred at the moment of contraction (this is the 'initial benefit' of Campbell, and the 'anti-spasmodic action' of Courty, Pajot, and Tarnier).

"B. Pain at the moment of contraction never entirely disappeared before complete loss of intelligence and cutaneous sensibility. While the women could answer us, they all felt at the moment of contraction a pain which seemed to them slightly or not at all diminished, but which in some cases was a very long pain (the contraction was shortened).

"C. In some women, who normally experience no pain in the interval between the contractions, chloroform, even when given in small doses, induced physical and mental excitement. In two women the excitation was so great that we had to cease its administration. Chloroform, however, was eagerly taken.

"D. In cases where chloroform was given in large doses, pain disap-

peared while muscular vigor was present. The women no longer answered, did not feel a pinch of the skin, but at the moment of contraction, while the face did not show the least suffering, partial reflex movements of the whole body appeared, and two or three of us had to hold them at this period.

"E. Finally, in women where contractions were energetic and pains were severe, complete anæsthesia was obtained with great difficulty, and it was with great difficulty that we kept them anæsthetized.

"Each contraction seemed to exhaust the action of the chloroform. The pupil, previously contracted, dilated at the end of every contraction, at the same time that cutaneous sensibility and intelligence rapidly disappeared. If in the course of our investigations we saw women suffering but little under the influence of chloroform, we must recognize the fact that before inhalations the pains had not been at all severe. As to that complete analgesia with conservation of intelligence and cutaneous sensibility, described by surgeons, and which according to some obstetricians always occurs, we found it an exceptional occurrence, observed but once in the twenty-three cases."

Another anæsthetic, *chloral*, has entered into obstetrical practice. According to some, the hydrate of chloral has the advantage over other anæsthetics of producing, without danger to mother and child, prolonged anæsthesia which, diminishing and even suppressing pain produced by uterine contractions, does not in the least modify the intensity of the latter. The latter proposition has been established in a thesis of Dr. Pelissier. But it seems that the use of chloral modifies the duration of labor by shortening it. (Lambert.) This is how Dr. Choupe explains the hypothesis, which at first sight seems paradoxical. Hydrate of chloral has especially been employed up to this time in cases of irritable females presenting irregular and frequent contractions. In these conditions we know that contractions lose in intensity what they gain in infrequency. Hence by producing anæsthesia and bringing about diminution of excitability, chloral makes contractions regular and permits each one to occur with far more energy and far more efficacy. (Franca.)

Yet it is but right to say that, despite all the hopes based upon chloral, despite the support of Drs. Bourdon and H. Choupe, its use has scarcely passed beyond the limits of experimentation. Observations of Pinard do not appear to him at all favorable. I myself have used it in one instance combined with chloroform, and I had no reason to be satisfied with it. Perhaps it would be preferable to chloroform in eclampsia. This is a question which has yet to be decided. We shall not speak of other anæsthetics.

[Chloral may not meet the same, yet it does fill other and quite as useful indications as chloroform. Besides rendering useless pains efficient, it overcomes rigidity of the cervix, calms excitement, and diminishes pain.—Ed.]

## ART. II.—VERSION.

*Version* is an operation by which we bring down, to the superior strait of the pelvis, one of the foetal poles which had been located elsewhere. There are two kinds of version, *cephalic* and *podalic*.

§ 1. CEPHALIC VERSION BY EXTERNAL MANIPULATION.—The ancients, filled with Hippocratic doctrines, considered any presentation other than a vertex as abnormal, and then, when the breech was in the superior strait, they tried by external manipulation, before rupture of the membranes, to turn the head (vertex), and to bring it toward the lower part of the womb. This operation was still practised whenever the head was found in one of the iliac fossæ (transverse presentation), or when it was inclined toward one or the other shoulder, or whenever a face presentation was made out. Now we know that a face presentation is nothing but an extended vertex presentation. Celsus was the first, in his “*De Re Medica*,” to advise, when the child is dead and the breech presents, that a search for the feet be made, and that labor be ended in this way. The difficulties in executing cephalic version in breech presentations were followed by abandoning all such presentations to nature, and as experience was gained they were finally classed among natural labors. Cephalic version was then reserved for transverse presentations, for inclined positions of the vertex, and for face. True, in the latter cases it is no longer proper to speak of cephalic version, but, as Mattéi says, rather of cephalic reduction; and as it is very difficult to recognize inclined and face presentations before rupture of the membranes, such reductions are only made after exit of the liquor amnii.

When operating, choose the hand whose palmar surface can most easily embrace the part of the head that is abnormally elevated, and introduce this according to the rules that we shall give later on.

In transverse presentations there is more displacement of the head, and the name *version* is here properly preserved, and since the diagnosis is quite easily made before rupture of the membranes, we should choose this time to execute cephalic version by external manipulation, for if we must introduce the hand into the uterus, it is better to end labor by podalic version.

The Strasbourg school, at whose head is Flamant, desires to reinstate cephalic version, even in breech presentations. Some German obstetricians, Wigand among others (1812), Hubert (of Louvain), and recently Guillemot and Mattéi (of Paris), have called attention to this manipulation, which we think has been much neglected. According to them cephalic version is advisable before and during labor, when the membranes are intact, or even when they are ruptured. In all cases, however, the foetus must be very movable within the uterine cavity.

Before labor, the cause which determines the presentation of the



shoulder not being removed by the act of cephalic version, the head will tend to again resume its abnormal position when the operator abandons his patient. Hence it will be preferable to perform cephalic version at the end of pregnancy, and at the commencement of the first contractions; that is to say, when the membranes are still intact, for after their rupture, as already stated, the majority of practitioners prefer podalic version.

One reason which, till to-day, has prevented this operation from becoming general, is, as Pinard says, the great inexperience of practitioners in *abdominal palpation*, so necessary in this operation of version. The author quoted even believes that with dexterity this manœuvre would enable us to readily substitute a vertex for a breech presentation; and he declares openly for body-bandages and girdles, not only to maintain the fœtus in the new position given it by version, and to remedy faulty accommodation so frequent in multiparæ, but also to give to the abdominal wall the support which it lacks, and to the uterine wall the fulcrum which it needs. He operates before labor, and even before the natural term of pregnancy.

I performed cephalic version by external manipulation upon one of Dr. Campbell's patients, where the right shoulder presented. The woman was at term and pains had commenced; we had followed the advice and example of Dubois. The operation was completely successful, Dr. Campbell being himself a witness.

When the operation is performed in the last months of pregnancy, according to Pinard, the woman must lie in a convenient position (as when we wish to practise palpation), and then we may expect to meet with one of two conditions:

1. The head may rest on a level with the iliac fossæ, the breech lying opposite.
2. The head may be in the upper segment of the womb and the breech below.

In the first case, the manipulation scarcely differs from that which we have ourselves described in former editions of this book; that is to say, apply one hand to the cephalic, the other to the podalic extremity, and by slow and sustained pressure, applied inversely upon either extremity, endeavor to bring the two foetal poles in the median line. I will give three important rules for this:

A. Place the woman in the lateral decubitus, on the side opposite the iliac fossa in which the foetal head lies. Pinard prefers dorsal and horizontal decubitus.

B. Only operate in the intervals between contractions, if we are practising version during labor, and firmly hold the fœtus in the position that we have given it if a contraction should occur during our manœuvre.

C. Since this manipulation induces voluntary contractions it may be advantageous to use chloroform.



Having brought the head to the superior strait, it must not be left to itself, for then the abnormal position might recur; but if we operate after labor has commenced, it must be held until the cervix is dilated sufficiently to permit artificial rupture of the bag of waters. Then the head soon engages in the superior strait, and once it is fixed therein we can leave the progress of labor to nature. If, on the other hand, we operate before the end of pregnancy, having brought the head into the superior strait, apply the girdle that is devised especially therefor by Dr. Pinard, even in cases where, at the eighth month, although the head may be below, there exists no pelvic accommodation.

In the second class of cases—when the breech is below—the first stage of the operation consists in moulding the fœtus.

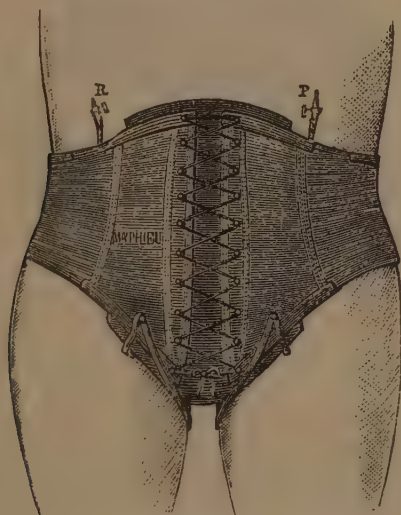


FIG. 72.—Front View of Pinard's Girdle.

It is in this case, above all, because of the difficulty experienced in operating on primiparæ, that experience in abdominal palpation will be of the greatest service to the practitioner. After the two ends of the fœtus become movable and accessible, the hands being applied to them, slow and sustained pressure must be exercised upon them, so that the breech passes upward and the head passes downward, always along the shortest route, then render the parts immovable with the girdle. (Pinard.)

Pinard's girdle (here figured) is composed of three pieces, two lateral, or right and left, forming the body of the girdle, and the intermediate, forming the complement at the anterior portion.

The posterior portions P and T are made out of thick ticking, whale-boned, and joined at the sides by elastic band C, and behind by buckles

which can enlarge or diminish the girdle according to the size of the abdomen ; in front it laces.

The band B, is made out of ticking, lined with flannel and is placed on the abdominal wall before the girdle is finally tied. It prevents contact with the laces, and makes the strong compression bearable. Bands pass underneath the thighs, to prevent the girdle from slipping upward.

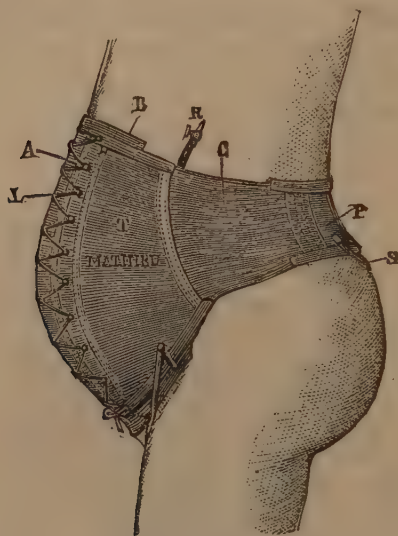


FIG. 73.—Side View of Pinard's Girdle.

Of course if the foetus is dead or its life is in danger, or if the mother's life is threatened and she is at full term, we give the preference to pelvic version.

§ 2. PODALIC VERSION.—Franco (in 1561), and after him Ambroise Paré, were the first who stated that the foetus could be extracted by the feet when the vertex had left the upper part of the pelvis. But Philomenus had advocated this practice on the living child. It is to Guillemeau, a student of Paré, that we owe the diffusion of the practice of podalic version to such a degree that cephalic version has now only a few partisans in the Paris and Montpellier schools ; podalic version would have remained in oblivion were it not for the physicians whose names we have just given.

The indications for podalic version have been stated under the head of dystocia, and the definition has already been given. We shall begin the details of the operation by considering the preliminary measures, then the conditions necessary for the operation, its dangers, and finally the manual operation and the difficulties that may complicate it.

*Preliminary Treatment.*—After having told the woman of the necessity for the operation, and having assured her as to its consequences, the obstetrician will tell the family what danger menaces the child's life. Then he will put the woman in the most suitable position. This varies according to the country. In France we generally use the ordinary bed, on which the woman lies crosswise. The bed is to have an extra mattress if it is too low. Several pillows are piled up behind the woman, and the buttocks are brought to the edge of the bed. The lower limbs are moderately flexed and the feet rest on two chairs, and if necessary are held by two assistants. Another assistant is on the bed to hold the pelvis and prevent the slipping of the patient.

In England the women are usually placed upon the side, the buttocks are brought near the edge of the bed and a pillow is placed between the knees to hold them apart. A rectal injection ought always to be given before the operation. Touch will discover the condition of the cervix and make out the presentation and position of the foetus, the latter determining the choice of hand. Everything that is necessary to a natural labor having been prepared, we must also have a lot of old linen in which to wrap the extremities of the child as the latter are delivered, pieces of tape a yard and a half long and almost an inch wide to tie around the foetal limbs, and lastly a forceps and a laryngeal tube. The obstetrician should remove his coat and thoroughly lubricate the dorsal surface of the hand he operates with, as well as the entire forearm. Avoid putting the oil or cerate on the palm of the hand which is to grasp the extremities, for they are already slippery. The choice of hand is determined by the situation of the anterior plane of the foetus, upon which the feet are always more or less completely flexed; and in cephalic and podalic positions we introduce the hand whose palmar surface faces the anterior surface and, consequently, the feet of the foetus. Thus, with occiput to the right position use the right hand, and with occiput to the left position use the left hand.

In shoulder positions the choice is less important; generally the right hand is to be introduced, as being most convenient for the obstetrician. However, if we reflect on the difficulty of executing the movements of pronation and forced supination when the bag of waters is ruptured, movements that are always necessary for the right hand in every case, we can understand how important it is to determine more exactly the choice of hands in this operation.

To make the choice we apply the same formula as for the vertex, changing the name of the *anterior plane* of the foetus to the *feet* of the foetus. The right hand should not be introduced in right shoulder presentations, except when the back is forward; the palmar surface of the hand is in this case turned toward the feet of the foetus, *i.e.*, toward the left of the pelvis. But if in the same presentation the back looks backward, the head of the foetus will rest in the right iliac fossa and the feet

will be at the left. Then we must introduce the left hand, though still we have to do with the right shoulder.

To sum up, we may state that, after recognition of the foetal position, the obstetrician should, in all presentations, introduce that hand which when placed between pronation and supination has its palmar surface turned toward the feet of the foetus. Some obstetricians always introduce the right hand, claiming that it is easier and suffices in every case; others, with Pinard, prefer the left hand, as being smaller and as a consequence easier of introduction. As for myself, I prefer to follow the rules already laid down, which are old and classical.

The free hand is to be applied to the fundus uteri to prevent it from moving or rising during manipulation. If necessary, the assistant's hands should likewise be employed.

*Necessary Conditions.*—1. Before thinking of performing podalic version, it is of the utmost importance that the cervix should be dilated or dilatable. A dilatable cervix is one which, while presenting a small orifice, is soft, supple, and capable of distention with two fingers, like the kid of good gloves. It is dilated sufficiently when its orifice has a diameter of  $3\frac{1}{2}$  ctm. ( $1\frac{1}{2}$  in.) and when at the same time it is supple.

This condition of dilatation or dilatability of the cervix is here of greater importance than for the application of the forceps; for a cervix slightly rigid may close after the passage of the shoulders, and thus imprison the head within the uterine cavity, compress the cord, and lead to grave complications.

Dilatability of the cervix is met with oftener in shoulder and face presentations than complete dilatation, because the foetal part is not wedged in the orifice, and the latter becomes more or less distended by the bag of waters, which, in these cases, is always large. This bag ruptures prematurely and the orifice, which was dilated, slightly contracts.

2. Another important condition for the performance of podalic version is that the part which presents shall not be too much engaged, for then we should have to push it back with violence. In vertex presentations, if the head has passed the orifice it is better to give up the idea of version and use the forceps.

When we read the observations of older practitioners we are struck with the skill with which they practised version and pushed the head above the superior strait in order to enter the hand in search for the feet. But they did not have the forceps at their command, and had by practice acquired a skill of which we of to-day are very much in need. In the execution of this manoeuvre we must be very careful to avoid rupturing the uterus or vaginal *culs-de-sac*. This may occur should we employ force in penetrating into the uterus.

3. Joulin, in his "Mémoire," which was crowned by the Académie in 1866, proves that to practise version with success there must be no dis-



proportion between the head and the pelvis ; for extension of the head after exit of the trunk is a complication which is to be more dreaded than considerable deformity.

Contrary, then, to Lachapelle, Simpson, and even Cazeaux, we shall state that when the pelvis is under  $9\frac{1}{2}$  ctm. ( $3\frac{1}{2}$  in.) it is preferable to employ the forceps for extraction of the foetus if its application is possible. Oblique ovate deformities are the only ones which form an exception to this rule.

Simpson, who advises version as a treatment for deformed pelvis, rested his statements upon the fact that the base of the cranium, being smaller than the biparietal diameter, engages like a cone in the narrow superior strait, under the influence of *traction* which may be made upon the lower limbs. The comparison is inexact, for this cone is truncated, and, besides, it is incompressible, while if the head is flexed and the occiput engages under the effort of contractions, aided by the forceps, it then far more exactly represents a cone, and the overlapping of the parietal bones diminishes the biparietal diameter. With considerable deformity the forceps, employed as an instrument of compression, even if it does bring forth dead children, permits us to end labor to the mother's advantage when version would not even be practicable. I ought, however, to state that recently the school of the Maternité, under the influence of its present chief, manifests a tendency to employ version in preference to the forceps when deformities of the pelvis exist. Their proclivity is more marked when labor occurs before term.

Only in the last-named cases do we share their opinions, and at full term we hold to Joulin's opinion and use the forceps.

4. There is a condition which, if not indispensable, at least remarkably aids penetration of the hand and evolution of the foetus ; it is the integrity of the bag of waters and rupture at the moment of introduction of the hand into the womb in the absence of contraction. (Lachapelle.)

Unfortunately in transverse presentations the membranes oftentimes rupture before a diagnosis has been made, but since it is then easy to make out the presentation, the obstetrician ought to acquaint himself with the exact state of affairs by every possible means, so as to perform the operation just as soon after exit of the liquor amnii as possible, so that the foetus may still preserve its mobility, which would otherwise be lost. It is this contraction of the uterus, after evacuation of the fluid, which always renders version performed under these circumstances so difficult for the obstetrician, so dangerous for the child, and so dangerous for the mother.

*Dangers of the Operation.*—Version is an operation which one ought not to practise with impunity after the liquor amnii has flowed away and when the pelvis is deformed, because it is then dangerous both for mother and child.

The dangers ought always to be kept in mind. For the *mother* they are :

1. Rupture of the vagina when the 'womb is very movable, and when the fundus cannot be conveniently supported.
2. Rupture of the womb itself when it is contracted, when its walls are weakened by any cause, when moulding of the foetus is difficult, and when the limbs form projections or bumps within the uterine cavity.
3. Subsequent inflammations on account of repeated and violent attempts.

For the *child* they are :

1. Violent pressure upon its viscera, which may compromise its life.
2. Detachment of epiphyses and dislocation of articulations when traction is very strong. I have seen the feet pulled off by an experienced practitioner performing version. I may mention, also, the frequent fracture of the long bones in their continuity that occurs in these cases.
3. Asphyxia of the foetus, on account of closing of the cervix around the neck, or compression of the umbilical cord either by the body or by the head. This danger is very great, especially in occipito-posterior positions, the cord then being in relation with the pubic arch.
4. Arrest of the head at the superior strait—a serious accident, which especially depends on a faulty proportion of the pelvis, and which (necessitating long and difficult manipulation) almost always induces the death of the foetus. Such an arrest, at the inferior strait, is not at all dangerous.

Finally, since the forceps has no dangers, we ought to reserve version for cases in which the forceps is not applicable.

*The Manual Operation.*—Version consists of three stages :

1. Introduction of the hand and the search for the feet of the foetus.
2. Movement or evolution of the foetus (Velpeau) ; rolling or turning (Dubois).
3. Extraction of the foetus, or delivery.

The first two stages are executed while uterine contractions are absent. The third, on the other hand, so as not to compromise the child, ought to be performed during a contraction, provided contractions exist.

1. Introduction of the hand and search for the feet. The woman being conveniently placed, the obstetrician, with his hand greased, standing erect or on his knees between the patient's legs, brings his fingers together in the form of a cone and inserts them into the vagina, following its axis and facilitating their penetration by a gentle motion of rotation. Dubois states that the hand must be introduced during contraction, so that the woman, busied with the uterine pain, does not notice the pain which the passage of the hand induces ; but we know, on the contrary, that a woman is always disposed to assert she is suffering pains, even when these do not exist.

Having arrived at the uterine orifice, we wait for a period of calm, during which the womb and cervix offer least resistance. If the membranes are still intact, two methods of entrance present themselves: either rupture the membranes by scratching them, or if they "balloon out" push them with the finger and enter the hand in search of the foetus without delay, yet without abruptness, so that the muscles of the forearm may plug the opening made in the membranes and prevent the liquor amnii from flowing out; or again, to avoid this almost certain loss of liquor amnii, leave the membranes intact, introduce the flat hand between the external surface of the membranes and the internal face of the womb, and carry it toward the place where we think the feet are situated. Do not rupture the membranes until the moment the feet are seized, so as to render evolution swifter and easier by means of this flow of liquor amnii.

This method, longer than the preceding, is usually employed in Germany and in France. Its advantages are counterbalanced by the danger afforded to the placenta, for it is liable to be detached and hemorrhage induced. Employ it only when time does not press.



FIG. 74.—First Stage. Occiput to the right; introduction of the right hand.

In entering the uterus, lower the arm upon the perineum to give the hand a direction of the axis of the superior strait (and hold the fundus of the uterus immovable with the free hand), gaining the feet by the shortest possible route. Should a contraction occur, the advance of the hand should cease and it should be placed over against the anterior surface of the foetus. When the contraction is over continue the movement of the hand till it catches the feet, which are to be firmly grasped, either by placing the index finger between the two internal malleoli, and the thumb upon the external malleolus of one side and the other fingers upon the external malleolus of the other; or, more simply, grasp the whole with the palm of the hand. If we cannot seize both feet at once grasp but one, version occurring as a rule when only one is grasped, so that Kuhn (of Niederbronn) has endeavored to establish "*monopodalic version*." (*Gaz. Méd.*, 1859.)

2. Evolution; movement; rolling or turning of the foetus. This is the true version. The foot, or feet, being firmly grasped, we profit by a period of calm to slowly fold the lower limbs and pull the feet toward the



vulva, rolling or turning the child upon its anterior surface so as to bring its cephalic extremity toward the fundus uteri and its back toward one of the cotyloid cavities. During this evolution, the hand applied to the abdomen to sustain the uterus pushes the head far from the superior strait, and thus aids the manœuvre. The works of Kuhn on the one hand and experience on the other have done away with the theory of a good and a bad foot in version.

[It is still our firm belief that version will be accomplished with greatest facility if that foot be seized which belongs to the side opposite to the presenting shoulder.—Ed.]



FIG. 75.—First Stage. Right shoulder, the back looking backward; the movement of pronation of the right hand is taking place, so as to bring the feet forward.

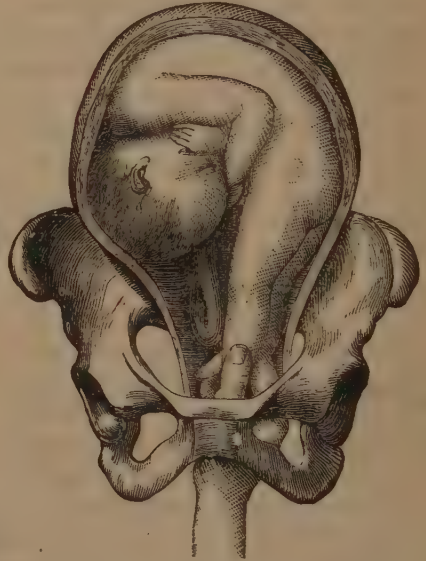


FIG 76.—Second Stage. Movement of the fœtus; flexion.

It is only in rare cases—when there is deformity of the pelvis—that the anterior member may be arrested above the pubis, thus constituting a very serious obstacle to the exit of the fœtus. This is remedied, however, by making the trunk execute a movement of rotation (by means of the limb which is outside), turning it upon its axis from without inward, so that the foetal part arrested in the antero-posterior diameter is placed by such a movement of rotation in relation with the transverse diameter of the superior strait. Engagement then occurs when we establish parallelism of the great diameters of the fœtus with the inferior strait; then version will terminate without difficulty.

It is thus, by catching above the pubis, that in some instances one arm crosses behind the nuchal region from below upward. We shall see what the physician should then do when we come to consider the difficulties of version.



If an obstetrician, but slightly familiar with this operation, has grasped a hand instead of a foot, and should he perceive after extraction what an error he has made, far from pushing the hand back into the uterine cavity, he should tie a tape about this hand, give it to an assistant to hold, and then search for a foot. He will avoid this error by habituating himself to distinguish the foot from the hand of a new-born child placed under a napkin, and recollecting that the foot forms an angle with the leg, while the hand is in the axis of the forearm, that the foot has a calcaneum (which is always a good landmark) longer than the hand, that the interdigital spaces of the toes are much *shorter* than those of the fingers; and especially that the big toe is on the same plane, and that it cannot be bent over the other toes as can the thumb upon the fingers. Touch will tell us, by means of the toe, whether we have seized the right or left foot.



FIG. 77.—Second Stage. The movement is executed with the right hand in the second position of the right shoulder.

To tie a tape upon the hand or foot, make a running knot with the tape that I have just mentioned and slip it above the malleoli or above the lower extremity of the radius and give the ends of the tape to an assistant; and when a foetal member is still in the vagina the obstetrician slips this knot over the extremity of the fingers, and seizing the foetal part he brings the loop over it by a gentle sliding motion. It may happen that when introducing the hand the loop drops on the physician's wrist; to obviate this there have been invented "tape-carriers" or "loop-carriers." Belgian obstetrics is rich in instruments of this sort; Hyernaux (of Brussels) and Wasseige (of Liege) have each invented a loop-carrier, but, as a general rule, by trying the manœuvre described several times we shall be successful.

## TABLE OF THE PRINCIPAL OBSTETRICAL OPERATIONS.

BY PROFESSOR PAJOT.

*In every obstetrical operation there are certain requirements, viz.: continuous action, slowness, carefulness (even groping, tentative efforts). Without taking these precautions, never use force. (Lachappelle.)*

## PODALIC VERSION.

With reference to version it is absolutely necessary (1) that the orifice should be dilated or dilatable; (2) that the fetal part (especially if it be the head) shall never have passed the orifice. It is better that the membranes be not ruptured.

*Version* is indicated whenever the life of mother or child is menaced, and when such danger will vanish upon speedy delivery, the foregoing conditions being present (see 1 and 2 above). When circumstances allow a choice between version and forceps (the head being engaged in the superior strait), we nearly always give preference to the forceps.

*Preliminary Requirements.*—Put the woman on a high bed, the buttocks at the edge. Four assistants. Empty bladder and rectum. Make out the presentation and position. Choose the hand (for cephalic and podalic extremities, the hand whose palm looks toward the anterior surface of the fetus; for the shoulder the choice is unimportant). Take off your coat. Grease the dorsum of the chosen hand, and the whole forearm. Put the unoccupied hand, or have the assistant's hand placed upon the fundus uteri. Wait till a pain or contraction ceases. (We suppose all the articles necessary to have at a normal labor to be at hand; in addition have tape, vinegar, laryngeal tube, and a feather.)

## COMPLICATIONS AND DIFFICULTIES OF VERSION.

## VERSION IS DIVIDED THUS:

Gently introduce the hand, in the form of a cone, into the vagina. At the orifice, if the membranes are not ruptured loosen them as high up as possible, but do not rupture them, or else rupture them below and enter rapidly. Carefully enter the uterine orifice but do not grope. (P. Dubois.) Reach the feet by the very shortest route (the position is presumably known). Firmly grasp the foot found. (If both can be grasped, all the better; but version can be performed with one alone.)

## FIRST STAGE.

*Introduction and Search.*

Never during a pain. The hand must rest and become flattened during every contraction. (A.)

1. *When the position is unknown.* Introduce the right hand; if this does not prove best, take it out and insert the other. 2. *Narrow vulva.* Not serious; finger by finger. 3. *Arm in vagina* (in shoulder). Never amputate, unless we perform embryotomy; and even then the arm will be useful to pull on. Combat retraction at first by bleeding, opiate injections, tartar emetic, and chloroform. If version becomes possible, tie a piece of tape about the wrist of the fetus to prevent the arm going up over the head) after having found out, from the hand of the fetus, which shoulder is presenting, and sometimes what the position is. If version is impossible, embryotomy. 4. *Fetal part obstructs entrance of the hand above the orifice.* Push it slowly back in the direction wherein evolution itself would tend to bring it. 5. *The feet cannot be found.* Follow the lateral and posterior planes of the child. If this be impossible, boldly but carefully carry the hand up to the fundus. (Dubois.)

## SECOND STAGE.

*Evolution, movement.* (Velpéau.)  
*Fœtal folding.* (Dubois.)  
 Same remarks as above. (A.)

Slowly unfold the member grasped. Bring the foot toward the vulva by moving the fœtus in a normal, "flexing" direction, so that the cephalic extremity turns toward the fundus uteri and the back of the fœtus toward one of the cotyloid cavities.

Difficulties in this stage arise chiefly from uterine contraction. Usually this stage is easily executed if all the water has flowed away. If the head tends to engage with one or both feet, tie the latter with tape and gently push back the head, pulling slowly meanwhile on the tape ends.

1. If by moderate traction it is impossible to finish version by means of one foot only, tie tape on this and find the other. 2. In version with one foot, if the other lower extremity goes up in front of the trunk hook your finger in the groin, but do not deliver this limb (its size is useful to prepare the way for the exit of the head). 3. When the back turns forward, a gentle, longish, spiral motion, groping, as it were, to find out to which side the back inclines to go. 4. When the arms go up over the head, deliver them, commencing with the posterior or easier arm. Lift the trunk diagonally for the posterior arm, but lower it for the anterior. Then the first and second fingers of the most convenient hand are slipped as far as possible upon the external and anterior surface of the arm, the thumb going in the axilla. (The other hand supports the trunk.) Always carry the limb toward the anterior surface of the fœtus. (For other accidents see "Traumatic Lesions of the Fœtus," Pajot's thesis.) 5. The head has not rotated. Introduce the index and middle fingers of the hand whose palm best grasps the occiput, slip them over the lower cheek of the fœtus into its mouth, and bring the occiput behind the pelvis. 6. The occiput is in the concavity of the sacrum. If the head is flexed, swing the fœtal toward the maternal back. If the head is extended, swing the child's toward the mother's abdomen. If delivery is impossible, use forceps. 7. The head is more or less extended in the pelvic cavity, or at the straits. Try and push the trunk back very gently, then introduce two fingers into the mouth, and two fingers of the other hand, forked, upon the nucha, and push the back of the fœtus toward the mother's abdomen, telling her to bear down. If delivery is still impossible, forceps or craniotomy according to circumstances.

Swathe the foot or feet in warm linen cloths. Traction and lateral motion in the direction of the axes, first downward. Grasp the parts with the flat of the hand. Hands of operator always near the vulva as long as the pelvis has not been delivered. Let the hands sustain the joints of the child. Watch the cord; if it is tense, draw down a loop. Let the rest of the trunk deliver itself, if time does not press and contractions are sufficient. If the arms are delivered alone, support the trunk and tell the woman to bear down to deliver the head. (We suppose the occiput under the symphysis, the usual state of affairs.)

## THIRD STAGE.

*Extraction, or delivery.*

Only performed during a contraction, except with inertia or serious accident, such as great hemorrhage, etc.

3. Extraction or delivery. This is the only stage of version where we ought to manipulate during uterine contraction. This facilitates the manœuvre, keeps the head flexed, and prevents the arms going up over the sides and over the head. In case inertia occurs, if version is indicated we must terminate extraction without waiting for contractions.

In order to do this, we pull on the feet, legs, and thighs of the foetus, wrapping each part in warm linen as it comes out; they are seized with the flat hand and close to the vulva. We are, above all, to turn the sub-pubic member in a manner which will facilitate rotation of the back of the foetus forward, the right hand holding the right abdominal member, the left hand the left abdominal member. We grasp higher and higher the more the foetal parts project, but never grasp higher than the pelvis of the foetus for fear of compressing the abdominal viscera.

Traction and lateral motion are first made downward in the direction of the axis of the superior strait; when the breech appears, deliver the posterior buttock first, lifting the foetal extremities toward the mother's abdomen. Prevent fatal twisting of the umbilical cord by pulling it down slightly, or delivering it if it should pass between the thighs. When the major part of the trunk is out and the shoulders arrive at the vulva, facilitate delivery of the posterior shoulder by lifting forward the trunk; then lower it to aid delivery of the anterior shoulder. In non-complicated version the head is flexed and its delivery will closely follow that of the shoulders; it suffices, to facilitate it, to lift the trunk and turn the back of the foetus upon the mother's abdomen, at the same time telling the woman to bear down, and thus delivery occurs at the anterior commissure of the perineum by the suboccipito-mental, suboccipito-frontal, and suboccipito-bregmatic diameters, as in breech presentations. This successive exit of hip, shoulder, and head resembles, says Depaul, three successive vertex deliveries.

§ 3. COMPLICATIONS AND DIFFICULTIES OF VERSION.—The difficulties may be considered in relation to the three stages.

*First Stage.*—1. *When the position is not made out*, either because of elevation of the foetal part or because of the absence of heart-sounds (dead foetus, etc.). As a rule introduce the right hand, and if this is not suitable to the position of the foetus, take it out and introduce the left hand.

This false manipulation, besides being very painful to the woman, results in exit of the liquor amnii. Hence, that it may not flow away, we must avoid, as far as possible, any chances of having to change the hand. Therefore, in shoulder presentations introduce the right hand (the left cephalo-iliac position being the most frequent); and in presentations of the cephalic extremity introduce the left hand, which corresponds to the anterior surface of the foetus in these positions of vertex and face that we most commonly meet with.

2. *A narrow vulva* is no longer a serious obstacle, thanks to chloroform,



and besides we may always introduce the fingers one after the other, sliding the thumb in the cavity formed by the other fingers.

3. *If the arm is in the vagina*, either as a natural result of engagement of a shoulder presentation, or on account of a false manœuvre; or again, if it has been pulled down to verify the diagnosis, we must find out the condition of the womb before proceeding further. When the exit of the arm is recent and voluntary, the uterus has not contracted and its internal surface is still sufficiently slippery, then we must tie a tape on this arm and search for the feet to perform version. The fixing of the member that has come out will prevent its going up over the ribs and head, and it does

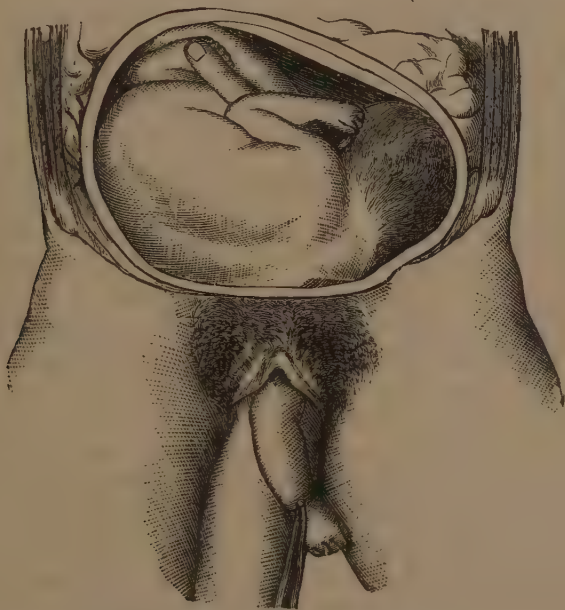


FIG. 78.—Complications during the First Stages. The arm is prolapsed; tape is tied; the feet are sought for (first position of the right shoulder).

not by its presence prevent delivery; but if the arm has been out for a long time and the uterus is retracted, the cervix compresses the arm and interferes with its circulation so that this member swells and appears black, swollen, cyanotic, and is an obstacle to the entrance of the hand into the uterus. In this case we must endeavor to overcome uterine contraction. To this end bleed the woman, making her sit upright so as to induce syncope; baths, repeated opium injections, with six to eight drops of laudanum in the smallest possible quantity of water, are to be given, an evacuant injection having first been administered, so that absorption may subsequently be more rapid. Chloroform or chloral may also give favorable results in these cases. An emetic has been advised to produce nausea,

[Here, as elsewhere in the book, do we discountenance bleeding, which the author so frequently advises.—Ed.]

If the arm is infiltrated we may lessen its engorgement by scarification. But finally, if all else fails there remains embryotomy. Auscultation, as well as the signs of life or death of the foetus, will tell us what we can hope for in this respect. If the foetus is living and we are forced to sacrifice it, far from amputating the prolapsed arm, the obstetrician ought to use it to lower the neck of the foetus so that he may be guided in the use of cutting instruments; and having made a section of the trunk, this arm will still be useful to make tractions with. We know that when the head alone remains in the uterine cavity it is very difficult to seize and extract it with any instrument. In a like circumstance a provincial physician, believing the foetus dead, amputated to facilitate version, and delivered a living child, to which he was condemned to pay a life allowance. This well-remembered instance occurred at a time when obstetrical auscultation had not become prevalent in the provinces; to-day it would be almost impossible, after rupture of the membranes, to commit such an error. Hence, if with a deformed pelvis the foetal part is so engaged that we cannot push it above the superior strait or introduce the hand, and if the foetus is recognized as no longer living, we may dislocate the shoulder and thus render the entrance of the hand easier. This is what I did with success in a similar case with Dr. Caron. We may, besides, facilitate dilatation by a few little incisions along the cervix, as already described in the chapter in which we considered *rigid cervix*; but if version is possible, with the arm in the vagina, held there by the tape, give this method the preference.

4. *When the foetal part prevents the introduction of the hand above the orifice* we must seize the presenting part with the hand, first push it a little above the superior strait and then toward one of the iliac fossæ, where it is held by the forearm which has entered the womb. This manœuvre is very difficult when the waters have escaped; and we must content ourselves with sliding the hand between the cervix and the part that presents, the movement of revolution inducing subsequently a movement of the foetal part toward the fundus of the organ. In presentations of the face (mento-posterior) the palm of the hand will meet the chin and push it along, with the head, into the opposite iliac fossa, so that the feet may be reached.

5. *The feet cannot be reached.* Baudelocque and his students state that instead of going directly for the feet, in the ordinary practice of version, we are to follow the posterior and lateral plane of the foetus, so as to more surely reach the feet by subsequently descending upon the breech and the inferior members. This manœuvre is very painful and difficult to execute, especially because of the contractions that it induces; and it should be reserved for those cases where the feet cannot be found by any of the methods just described. Dubois advises, when this search is futile, that

the hand be thrust boldly but carefully up to the fundus of the womb, and having arrived there, an event announced by the woman's cries, spread the hand and descend successively upon the anterior, posterior, and lateral faces of the womb, by which means we cannot help finding the feet somewhere.

*Second Stage.*—Difficulties that are met with in the second stage all depend on uterine contraction. Whenever rupture of the membranes immediately precedes the operation the second stage is *not* difficult, because there is still fluid present; when this is not the case there may be three complications: 1. The head of the foetus may rest immovable, and version becomes impossible. 2. The head tends to engage with the feet, and to become locked with them. 3. Foetal projections bring about rupture of the uterus during evolution.

To obviate the difficulties in the first case I recommend the method employed by Dr. Guillon, of Royan (*Revue de Thérap. Médico-Chirurgicale*, February 1, 1874), in a case where version was impossible on account of uterine contraction. He passed a tape around the foetal trunk, and by powerful traction aided podalic version. The tape, in this instance, slipped up to the inguinal fold, and aided in bringing the breech within the pelvic cavity.

In the *second* case a tape must be placed upon the feet and the head gently pushed back with one hand, while we steadily but slowly pull on the ends of the tape that hang out.

In the third case we must do what has been advised in rupture of the uterus.

*Third Stage.*—1. *If by moderate traction it is impossible to finish version with one foot, tie a piece of tape around this foot and search for the other.*

2. *If in version, by means of one foot, the other podalic member goes up in front of the foetal trunk, instead of delivering the upraised member as in the preceding case, the obstetrician will place the crooked finger in the groin, on the external portion, so as not to injure the genito-urinary organs, and pull on the member which is out, and at the same time upon the inguinal fold. In this way the cervix will dilate much better than with only one limb, and the umbilical cord, protected by the kind of triangle formed by the abdominal and thoracic walls of the foetus and the upraised leg, will not be compressed.*

3. *When the back turns forward we must turn it again toward one of the cotyloid cavities by a long spiral motion. If the back tends to turn more toward one side than the other, favor this motion instead of opposing it.*

4. *When the arms go up beside the head, or when they are crossed behind the nuchal region. The former of these complications is very frequent. It happens whenever we pull upon the trunk during the absence of uterine contractions, or when the foetus is extracted too rapidly, or when the pelvis is slightly narrowed, and the cervix is contracted.*



When the shoulders arrive at the vulva we perceive that the arms have gone up. To deliver them we use the right hand for the right arm and the left hand for the left arm. We must take the precaution always to commence with the *posterior* arm, for it offers less resistance, since it is in relation with the soft parts.

If the right arm is behind, place the trunk of the foetus, enveloped as we have described, upon the left forearm and lift it up so as to aid our



FIG. 79.—Complications of the Third Stage. Delivery of the arms which have gone up over the foetal head.

manipulation; then pushing the index finger of the right hand deep into the cavity, and placing the middle finger upon the external and superior surface of the humerus, give the hand a movement of pronation so as to place the thumb in the foetal axilla; the arm being then seized as with a splint, move it in the direction of normal flexion, bringing the forearm in front of the face, sternum, and against the lateral portions of the trunk.

Then lifting the foetus off the forearm, bend the trunk far down in order to extract the subpubic arm. To do this the left hand of the operator, inserted like the right hand (*vide supra*), should execute the same manœuvre, which is nearly always successful. Sometimes it happens, especially when the sym-

physis is deformed, that the subpubic arm is fractured. If this occurs all we have to do is to put the foetal arm into a stiff piece of paper folded in the form of a groove, and put a little bandage around it to keep it in place. In about fifteen days the fracture will be united.

If the arms have gone up very far, one, rarely both, may pass the level of the parietal eminence and cross the nuchal region from above downward. Delivery is a little more painful, but it is effected as in the preceding case. It may happen that this arm may be crossed from below upward, that is to say, that the arm goes up from the back to the nucha. We have described the mechanism. In this instance the subpubic arm usually undergoes such a displacement.

Before performing reduction we must be assured as to the manner in which the arm is crossed behind the nucha. Stoltz's rule to establish a diagnosis consists in finding out the situation of the inferior angle of the scapula, which in movements of exaggerated extension is applied directly



to the ribs, is scarcely to be felt, and is very far away from the vertebral column; while if crossing occurs this angle is prominent and covers the spinous processes of the dorsal vertebræ to which it is approximated.

In this case, after having caught the elbow with one or two fingers, we only have to draw it from the nucha toward the loins, so as to bring it down around the back and finally over the sides of the fœtus.

Depaul, thinking this diagnosis very difficult, advises us first to try reduction as if the arm had crossed above, and then, if this is not successful, to pull it as we have just described. We think that these attempts should only be made when it has been impossible to make a diagnosis, for they are always dangerous to the scapulo-humeral articulation of the fœtus.

5. *The head has not performed its movement of rotation.* We know that in normal delivery by the breech, when the shoulders have come out of the vulva, the head rotates, usually bringing the occiput under the symphysis pubis; but this rotation, in version especially, may not occur, and delivery then becoming complicated, we must produce artificial rotation. Two methods are recognized: the first, formerly employed, consists in introducing the index finger of one hand behind the head in the cavity of the sacrum and seizing the foetal head in the zygomatic fossa, for instance; the index finger of the other hand is to be introduced under the symphysis pubis and placed in front of the foetal head at a point opposite to the first finger, the foetal trunk meanwhile being held and sustained by the two forearms. The head is made to execute its normal movement of rotation, while the trunk is turned by the two forearms which embrace it.

This method is not always followed by satisfactory results, for we are not able to use much force; hence Professor Pajot has substituted therefor an operation which consists in introducing the index and middle fingers of the hand whose palm embraces the occiput most conveniently up to the anterior cheek of the fœtus and thence into the mouth, the thumb being placed upon the superior cheek; the trunk of the fœtus is seized with the other hand, and then rotation is performed, the occiput being brought behind the pubis, while the trunk of the fœtus follows the same movement, twisting of the neck being thus avoided.

6. *There is posterior rotation and the occiput remains in the sacral cavity.* Here we have one of those phenomena which sometimes occur during natural delivery by the breech. The face then looks forward and the occiput backward. In this case two positions may be found: (1) the head remains flexed and the chin approximates to the sternum. If the head is large and the pelvis is large we can deliver by bending the trunk upon the perineum and lowering the face in the pubic arch, with the fingers touching the sides of the nose; Pajot calls this the movement of "back upon back." Or, again, (2) in exceptional cases the head is extended and the neck is stretched. The manœuvre just indicated will be

arrested by the chin behind the symphysis ; then, lifting the trunk in front of the pubis, let the occiput engage first of all at the anterior commissure of the perineum ; this is Pajot's movement of "abdomen upon abdomen."

7. *The head is extended in the superior strait or in the pelvic cavity.* This extension in the superior strait is very serious. It seldom occurs except in deformed pelves or with contraction of the cervix. In these two instances pressure carefully made upon the hypogastrium may force the head to become flexed ; once, with Dr. Bouland, I succeeded, using one blade of the forceps introduced like a lever and making a fulcrum of the occiput, in flexing the head and ending labor. But it must be owned that failure is the rule, and if we continue to pull we may produce separation of the neck of the foetus after inducing complete exhaustion in the mother. Baudelocque advises us to apply the forceps, but here the use of this instrument is difficult and dangerous, since the hands of the obstetrician cannot guide the blade upon the foetal head, for the trunk occupies the vagina, and we are thus liable to commit grave errors.

Champetier de Ribes, in his remarkable inaugural thesis, after having studied the conditions of passage of the head through the narrowed superior strait, concludes that the head is at first directed transversely and inclines backward.

"Under the influence of tractions," he says, "the posterior side of the base passes and first enters the pelvic cavity. The head continues to descend, preserving this inclination, and consequently the posterior portion of the vault engages more deeply than the anterior, up to the moment when the parietal eminence arrives, behind, at the level of the superior strait. At the same time the head is flexed and is carried *en masse* into that half of the pelvis where the occiput lies ; it turns in such a fashion that the posterior parietal eminence is lodged in the cavity formed by the junction of the promontory with the wing of the sacrum, and it abuts against the bone which limits, at this point, the opening of the pelvis, until the fronto-parietal suture is in relation with the most prominent portion of the promontory. The anterior surface of the vault then performs a swinging motion around the immobile parietal eminence, and the parts which rest against the pubis pass through the strait. The anterior parietal eminence thus passes through before the posterior.

"Marked flexion of the head is the condition that favors descent. When the head is flexed the malar prominence no longer impinges against the superior strait, and the sliding motion within that part of the pelvis where the occiput lies occurs quite readily ; the fronto-parietal suture may lie in front of the most projecting portion of the promontory of the sacrum."

The inferior maxilla upon which we pull with two fingers introduced into the mouth, when this can be reached, seems to Champetier de Ribes the best point to seize and upon which to exercise traction.

By means of the following manœuvres we give no small aid to extraction ; these manœuvres are called those of Champetier de Ribes :

"1. Push directly backward that side of the base of the neck which descends behind the symphysis pubis, in the concavity of the sacrum.

"2. An assistant is to aid *expressio foeti* by directing force upon the frontal region and in the direction of the axis of the superior strait."

N. B.—In this manœuvre the force used should never exceed .25 kilogr. (55 lbs.). If with all these efforts the child dies, which often happens because of compression of the cord and subsequent asphyxia, we must without hesitancy perform detrusion with Dubois' scissors, and then obtain the head with instruments, unless we prefer to leave its expulsion to efforts of nature.

In the former case, the head remaining within the uterine cavity rolls about in every direction, is easily displaced, and is very difficult to seize with the forceps ; and it is best to use Hatin's method to fix the forceps (see Art. "Forceps"), and have the head fixed at the superior strait by the hand of an assistant. In the second case the uterus, after a longer or shorter period of repose, again begins to contract and finally expels the foreign body. I saw a case of this kind following premature delivery ; the trunk was in the hands of the obstetrician, who had given ergot in the hope of inducing a speedy expulsion. Called to see the case, I ordered all attempts at extraction to be abandoned, gave the woman a bath and had her brought to the clinic, where we continued our "expectant plan" of treatment ; the next day the head of the foetus and the placenta were spontaneously expelled.

When the head is extended in the pelvic cavity the difficulty is far less. Then the trunk of the foetus is to be placed upon the left forearm and attempts are to be made to push it gently into the pelvic cavity ; at the same time the index finger of the left hand is to be slipped into the sacral concavity and introduced into the mouth of the foetus, grasping the inferior maxilla. Two fingers of the other hand are to be applied to the occiput to increase flexion ; then while the trunk is lifted up the chin is lowered toward the sternum, and the back of the foetus is turned upon the mother's abdomen, the woman being ordered to "bear down."

When it is impossible to deliver the head with the hand alone use the forceps, and in some rare cases perform craniotomy. If the occiput is behind and delivery is impossible, before having recourse to the forceps we may try, as Lachapelle advises, to change the position of the head by the manœuvre already described, by bringing the face backward toward the sacral curve. It is understood that the trunk must be made to follow the movement of rotation that we have given to the head. But if we use the forceps, in all cases we must imitate with this instrument the manual delivery just referred to.

*Remarks.*—In different books we find precepts for the performance of

version in the different presentations. But the details in treatment which each of these presentations may require all refer to introduction of the hand. We think it will be useful to students to give a recapitulation of these at the end of this article. The general precepts that we have mentioned are applicable to all cases of version.

With our third edition we obtained Pajot's permission to give his tables. He even revised them with his own hand in order to bring them abreast our present knowledge. We give them again in this fourth edition and we profit by this occasion to thank again personally, as well as in the name of all our readers, the distinguished man who to-day we may consider as the first among the masters of obstetrics in France.

Finally, when the foetal part prevents the introduction of the hand, try to push it toward the corresponding iliac fossa during an interval between the pains. To do this in vertex and face presentations, the hand having arrived at the cervix is to seize the head in such a fashion that the palmar surface of the four fingers can be placed upon its posterior surface, the thumb upon its anterior surface, the sinciput or face thus being lodged in the palm of the hand.

In shoulder presentations, after having pushed the shoulder above the superior strait and slightly toward one iliac fossa, pass the hand directly along the anterior surface of the foetus to the spot where the feet are, or, following the posterior surface, arrive at the breech, which we cross, and, changing the direction of the hand, then grasp the feet. The latter method is easier in dorso-posterior presentations.

#### PODALIC VERSION.—RECAPITULATION.

	Position.	Hand to be introduced.	Side of the pelvis where the back engages.
Vertex.	L. O. A. ....	Left.	Right cotyloid cavity.
	R. O. P. ....	Right.	Left cotyloid cavity.
	R. O. A. ....	Right.	Left cotyloid cavity.
	L. O. P. ....	Left.	Right cotyloid cavity

#### Observations.

Transverse positions demand the introduction of the hand precisely as in the corresponding positions of the vertex.

Inclined positions—if we prefer version to reduction or forceps—are treated according to identical rules.

	Position.	Hand to be introduced.	Side of the pelvis where the back engages.
Face.	R. M. P. ....	Left.	Right cotyloid cavity.
	L. M. A. ....	Right.	Left cotyloid cavity.
	L. M. P. ....	Right.	Left cotyloid cavity.
	R. M. A. ....	Left.	Right cotyloid cavity.



*Observations.*

The rules are the same as for vertex, since the feet have to be sought for and extracted along the plane of anterior flexion at one side or other of the pelvis—the condition of the head requiring no change whatever in manipulation.

	Position.	Hand to be introduced.	Side of the pelvis where the back engages.
Breech.	L. S. A.....	Left.	Left cotyloid cavity.
	R. S. P.....	Right.	Right cotyloid cavity.
	R. S. A.....	Right.	Right cotyloid cavity.
	L. S. P.....	Left.	Left cotyloid cavity.

*Observations.*

In breech presentation we do not, properly speaking, practise version, but rather perform simple traction upon the part which presents at the superior strait. When the buttocks are engaged and can be reached by the fingers, the two index fingers curved like a hook are placed in either groin, and traction is made until the hips and feet are delivered.

	Position.	Hand to be introduced.	Side of the pelvis where the back engages.
Right Shoulder.	Dorso-anterior .....	Right.	Right cotyloid cavity.
	Dorso-posterior .....	Left.	Left cotyloid cavity.
Left Shoulder.	Dorso-posterior .....	Right.	Right cotyloid cavity.
	Dorso-anterior .....	Left.	Left cotyloid cavity.

*Observations.*

In shoulder presentations the choice of the hand is less important; the feet, once seized, will be brought into the vagina without it being necessary, as in vertex or face presentations, to turn the fœtus in the direction of natural flexion.

[Chloroform will greatly facilitate version in every case, no matter how simple the operation may seem as we approach it.—Ed.]

## ART. III.—FORCEPS.

This instrument was invented by a member of the Chamberlain family in London, about the seventeenth century. (*Gaz. Obstet.*, Nos. 21, 22, 1873, A. Mattéi.) Straight and non-fenestrated at first, it was kept as a secret in that family, and considerably enriched its members. Since its origin it has undergone very many modifications, the most important of which is Levret's, made about the middle of the eighteenth century. The straight forceps could not be applied except in the pelvis, and Levret, in giving it a curve that accommodated it to the axis of the pelvis, made a great step forward in the obstetric art, for living children could be extracted whose

heads were retained above the superior strait. Levret, however, seemed only to think of the posterior commissure of the vulva, which was sometimes torn by the forceps. It was Smellie of England who, about the same period, similarly modified the old-fashioned forceps and first applied it in the superior strait. Each claims priority in the discovery. Despite many other important modifications, Levret's forceps is the one adopted in France. These two men, modifying Chamberlain's and Palfyn's forceps, regarded not only the form of the foetal head to which the forceps was to be applied, but also the curve of the pelvis in which the instrument was to be introduced.

Such as it is to-day, Levret's forceps has been a model for Nøgele's, Siebold's, Stolz', and Simpson's forceps. It is a large forceps, its two shanks crossing, and is solely for application to the foetal head. Each half has a blade, a joint, and a handle or hook. The blade is fenestrated, which diminishes the size and weight of the instrument and allows us to slip it over the parietal eminences. It has two curves: the one on the surfaces is called the old curve and is convex externally and concave in-



FIG. 80.—Locked Forceps.

ternally, so as to be adapted to the foetal head; it is serrated like a file so as to prevent any slipping; the other curve, the *new curve*, is at the edges and has an inferior convexity and superior concavity, so as to accommodate the instrument to the pelvic axis. This second curve is more marked in Hatin's model than in Dubois'. The lock or articulation varies according to the manufacturer, according to the country, and according to the blades. The blades join by an entablature or demi-entablature in the form of a fish-joint. Some models are filed flat, so that in such instruments the blades, despite super-position of their handles, lie upon the same plane. Besides this, one shank has a movable pivot or pin (Dubois' model), may have the thumb-screw (cephalotribe), or a large-headed stud (the English forceps); the other has a central mortise (Levret, Dubois), or a side mortise (Siebold), which is for the reception of the pin- or pivot-shank, whether provided with screw or stud.

The former has received the name of the pin- or pivot-shank; the second is the mortise-blade or shank. The rounded portion of the mortise runs along the base of the pin or pivot, while the larger vertex of the movable pivot crosses the mortise, after having gone through it, so that it affords a point of support for the obstetrician's hand when he wishes to

seize the handles of the forceps. Instrument-makers, according to old usages, designate the former as the *male* and the latter as the *female* blade. The description of the blades by Professor Pajot determines not only the place of application for each blade, but also the hand in which it is to be held; and, with this methodical and excellent physician, we give the name *left blade* to the pivot blade, because it is always inserted into the left of the pelvis, being held with the left hand; and of course the *right blade* is the one with the mortise. This classification reconciles that of Lachapelle and Velpeau, who formerly could not agree upon the name to be given to each blade.

Each handle presents a curved extremity which may serve as a blunt-hook and can be inserted over the groin, armpit or popliteal space of the fœtus. This crochet is sometimes provided on one side with a little bulb, which unscrews and discovers a point which can transform the shank into a sharp crochet. On the other side we find (according to the instrument-maker) either a very blunt crochet or a sharp straight point which may, at times, serve for perforation of the skull and which is likewise contained in the hollow extremity of the blade. Finally, a lock serves to connect the blades.

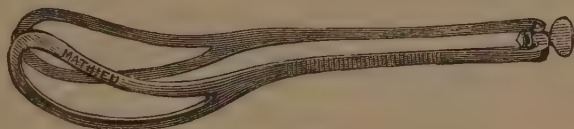


FIG. 81.—Lyon nais Forceps with Parallel Shanks.

Very soon we shall speak of the method of applying the forceps, which has been so greatly simplified by Pajot; but I do not wish to omit referring to the choice of a forceps for the every-day practitioner.

Every obstetrician wishes to perfect the instrument of which we are speaking. I shall only refer to the Lyon nais forceps with parallel blades, whose type is that of Thénance and which has been adopted with few modifications by Valette and Chassagny. Its application is similar to that of the crossed forceps.

Neither shall I describe the leniceps of Mattéi, which, even though it has the advantage over ordinary forceps of being closed to a greater or lesser extent at will, still has the great disadvantage of having too short shanks to be applied in the superior strait. The same disadvantage of shortness of the shanks belongs to the retroceps of Hamon; this instrument has this advantage over the leniceps in locking, viz., it is more easy to introduce. It differs from it, however, as well as from other forceps, in being unsymmetrical. It is, in reality, only another kind of lever.

[The *leniceps* is a forceps having the two blades attached to a *horizontal* handle, the blades being immovable when the instrument is applied. The

retroceps is an instrument for grasping the posterior portion of the foetal head.—Ed.]

But I must mention a new modification, or to speak more precisely, a new forceps, that has been invented by Dr. Tarnier and which has been already modified since its invention. At the end of this chapter we shall devote a separate article to it.

To return to the classical forceps, we may state that an obstetrician ought to have two forceps, a large one for the superior strait and the remote portions of the pelvis, and a small one for those cases where the head rests upon the perineum and only has the vulva to pass. The latter, called the English forceps, need not be so markedly curved as the former; the shanks are generally of wood, and there are no crochets at their extremities. It is light, small in size, and its application, needing no preparation, is so easy that we can use it without the woman's knowledge, and even without asking her to change her ordinary position. The old straight forceps is useful in cases of face presentation when the chin remains behind. But the obstetrician who only has one forceps should prefer the large one, which measures 5 in. from the blade to pivot. It suffices for all cases, and because of the length of the arm of the lever ( $8\frac{3}{4}$  in.) it does not cause so much compression of the foetal head. The instrument should be thin, elastic, and made of excellently tempered steel; the internal curve of the blades should be marked enough to retain the head and prevent slipping (2 in.).

[The blades should not be too elastic, lest when traction is made the tips of the blades will separate and be drawn forward upon the head. Then by the constant spring pressure of the blades these tips may be made to impinge with dangerous force upon the child's head.—Ed.]

Finally, since the size of such an instrument is a disadvantage, Professor Pajot made a large forceps which comes to pieces and yet is not lacking in solidity. There are various methods of adjustment for the different parts of the instrument, which can be carried in a leather bag scarcely occupying more room than an ordinary case of surgical instruments; hence the obstetrician can always have it with him. For myself, after having used the folding or jointed forceps for a long time, I have come to prefer the straight forceps. I have modified the ends of the blades by inserting a transverse handle which enables traction to be performed. The upper curve of the border of a single forceps ought not to be too great, so that it can be applied in all cases. When the instrument is locked and placed upon a horizontal plane, it seems to me preferable that the highest point of the blades above that plane should be  $3\frac{1}{2}$  in. The more marked curve will, no doubt, allow surer action in direct applications at the superior strait, but it will render dangerous any oblique application, and will go too far beyond the head of the foetus. Dr. Tarsitani has invented a forceps with a double pin or pivot, to avoid crossing of the handles; this in-



strument has so many disadvantages that it has taken no rank in the obstetrical armament of French physicians.

We must mention the use of graduated force. Joulin and Hamon (of Paris), Chassagny and Poulet (of Lyon), and Pros (of Rochelle) have constructed apparatuses so that muscular effort can be increased, without fatigue for the physician and without danger to the mother. Later on we shall give our opinion of these devices, which opinion is the result of teaching and practising obstetrics for twenty years.

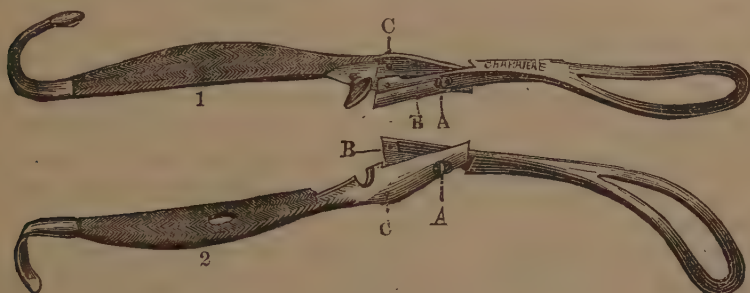


FIG. 82.—The Folding or Jointed Forceps. 1, The left shank; 2, the right shank; A, movable pin; B and C, fastening points.

*Conditions for Application of the Forceps.*—Before we think of applying the forceps the cervix must be dilated or dilatable, as in the case of every obstetrical operation which is performed within the interior of the womb. We have already explained ourselves sufficiently on this point. But the condition of complete dilatation is sometimes less necessary for forceps than for version, provided, however, the blades of the instrument can enter the womb. There are cases in which, when the indications for operation are urgent and the cervix is incompletely dilated, we must make small incisions at the orifice to allow introduction of the blades.

It is best that the head—the forceps is rarely applied except upon the head—should be engaged and fixed in the superior strait, and that the antero-posterior diameter of the pelvis should not be less than three inches. Less than this we can still advantageously use the forceps, but in such cases we rarely deliver a living child.

Some authorities think that the forceps can be applied to the breech. If the foetus is alive it is more prudent to abstain, because of the danger of compressing the abdominal organs or crushing the bones of the lower extremities. Manual delivery ought always to be preferred in such cases.

Finally, it is indispensable that the membranes should be ruptured. This operation must be performed before introducing the forceps.

*Indications for Forceps.*—As when speaking of version we shall refer the reader to what we have said under the head of dystocia, yet in a few sentences we may give a *résumé* of the chief indications for the use of the forceps.

1. When labor is tedious because of feeble or slow contractions, and when ergot is contra-indicated, when contractions have been arrested, and the head has for two hours rested upon the soft parts; when the perineum is very resistant; in inclined positions of the vertex and face, when reduction has not occurred; or in posterior positions of the face, when rotation has not occurred; when the cord is short, or when proclivitas has occurred, the forceps is indicated.

2. When there is a disproportion between the dimensions of the foetal head and those of the pelvis; when a deformed pelvis still leaves one measurement of three inches, the forceps may be applied. It must not be forgotten that the forceps is an instrument of prehension, not of compression, and that when we use it we should always have in view the welfare of the mother, as well as that of the child. If we were to make it an instrument of reduction its use would cease to be considered as an operation of the first class, and it would be an instrument of less value than the cephalotribe.

3. When feebleness of the mother's health, or some such condition as hernia or aneurism, prevents the woman from "bearing down" during labor, use the forceps.

4. Finally, with Professor Pajot we will say, "whenever the mother or child runs any danger, and this danger will cease when labor is ended, the forceps is indicated."

These dangers to the mother are: hemorrhage, eclampsia, etc., and here our guide must be the general condition of the mother. For the child, any obstruction to the circulation that may lead to death from asphyxia will be shown by alterations in the pulsations of the cord, and especially by irregular and feeble heart-sounds; finally, the presence of meconium in the liquor amnii in head presentations becomes a certain sign that the foetal condition is abnormal.

*Preliminary Precautions in Applying the Forceps.*—After telling the woman the necessity for and the harmlessness of the operation, both for herself and the child, and after having told the family of all that may happen, we must—

1. Place the woman in the same position as for version; have the raised thighs supported by an assistant who stands in front and upon either side of the woman, a third assistant firmly holding the pelvis: a fourth assistant may be necessary to hand the shanks of the forceps to the obstetrician, and if chloroform is administered, a fifth must attend to this part of the operation.

If the small English forceps is used, when the head is just within the vulva the woman may be left lying horizontally upon the bed, precaution being taken to raise the breech by means of a hard pad beneath her buttocks.

In England the forceps is applied without the woman's changing her

position, that is to say, she lies upon her left side, the buttocks near the edge of the bed. Three assistants are employed: the first supports the right knee and thigh; the second, opposite the obstetrician, holds the woman; and the third is to assist the operator.

2. It is best to plunge the forceps into hot water, so as to avoid shock from cold, which may check contractions; in doing this feel with your hand so as to judge of the temperature of the water compared with that of the body. The instrument should then be wiped off with clean dry linen, and oiled upon its external surface with some oleaginous material, so as to render its introduction easy.

It is useless to show the instrument to the woman unless she demands to see it, because nearly all patients are alarmed at the sight of what is to be introduced into their body. After delivery you can show it to her and explain its use, and nearly all will, at a second delivery, request that the instrument which was so fearful at first be applied again.

3. Anything that is necessary to a natural labor, and particularly those means that may be required to reanimate the child, should be at hand, and we should first give an injection to the woman and have her urinate. Then by a second examination determine the position of the foetal head, in order to decide what sort of application we are to make; and at the same time find out the degree of dilatation or dilatibility of the cervix, and also discover the volume and the reducibility of the head. The dimensions of the pelvis should have been determined by a former examination.

When the head is engaged in the cavity it becomes an obstacle to such an examination, and its presence in this spot at least indicates that the superior strait has not opposed engagement.

After having called for more complete dilatation for version than for introduction of the forceps, I ought to add, however, that a hard and resistant cervix is often an insuperable obstacle to extraction of the head even by our most skilful efforts, and this moreover we know to be contra-indicated by the principles that we have enunciated.

*Different Methods of Applying the Forceps.*—*The forceps applied with reference to the head only.* It may be applied when the head is still above the superior strait, or when, after having passed this strait, it has completed, to a greater or less degree, the movements of engagement and internal rotation.

In the former case the application must always be direct, that is to say, the two blades are to be placed directly upon the sides of the pelvis; the head is thus seized more or less irregularly, but sometimes rectification of this occurs within the blades of the instruments themselves.

In the second case, if the movement of internal rotation has been executed, and *a fortiori* if the head is behind the vulva, a direct application may still be made; but delivery will differ according as the occiput is placed under the symphysis pubis or within the concavity of the sacrum.

These are the two cases in which direct or "pelvic" applications are to be made. We ought, in addition, to have recourse to this method of application in certain cases of cephalic presentations in which the diagnosis of the position has not been made.

In all other cases, when the movement of internal rotation has not occurred applications are to be oblique; that is to say, *the superior concavity of the instrument is to be turned toward that fetal part which we desire to bring underneath the symphysis pubis.*

Now the fœtus always engages obliquely or transversely, and since we ought to take the latter circumstance into consideration, it follows that the occiput will be in relation, or nearly in relation, with one of the two extremities of each oblique pelvic diameter. Hence, we have two oblique applications of the forceps: the *right oblique* and the *left oblique*.

We shall recur later on to the details of the operation according to these indications. In all these various cases a perfect manœuvre consists in seizing the fœtus at the ends of its biparietal diameter, and by this it is that we recognize the consummate obstetrician.

§ 1. DIRECT APPLICATION OF THE FORCEPS.—We owe to Professor Pajot simplification of the application of the forceps, by submitting that application to fixed and immutable rules; and it may be said that to his forty years of generous and official instruction the present medical generation owes its initiation to comprehension and management of the practical difficulties of obstetrical operations.

The rules for direct application (imitating those that we have just given for version) are divided into three stages, in order to facilitate their study:

First stage: Introduction and placing of the blades.

Second stage: Locking.

Third stage: Traction and delivery.

The first two stages, as in version, are performed in the absence of uterine contractions.

The third, on the contrary, ought to be aided by uterine contractions whenever these exist.

Concerning anæsthesia, we should conform to the rules already given, not forgetting that there are applications made, when the head is in the vulva, that do not derange the woman in the least, and which are sometimes performed without her knowledge; in such cases there is no need for anæsthetics.

*First Stage: Introduction and Placing of the Blades.*—We must always commence with the left blade. No doubt there are exceptions to this, but exceptions only confirm the rule; and thanks to this very dictum, the application of the forceps has become a simple matter.

The physician, standing between the woman's legs, holds the *left blade* in the *left hand*, on a level with the lock, and slips it into the *left side* of the



pelvis, always inserting it *first*. The blade should be held flatwise but not stiffly, rather as we hold a pen in writing. Hence "everything is left<sup>1</sup> except the obstetrician," as Pajot wittily says.

The *right* hand of the operator must be oiled on *both surfaces*; and if the forceps is to be applied at the superior strait, the entire hand except the thumb should previously be inserted into the vagina and always *into the uterine orifice*, so as to *guide the blade* of the forceps; if the application is made in the pelvis, two fingers will probably suffice to guide the left blade. This blade, first directed parallel with the right groin of the woman, is to be introduced under the vulva, at a level with the left sacro-sciatic ligament, the free end of the handle being raised; and when it shall have entered, the hand must be gently slipped up to the extremity of the crochet, which is to be lowered between the woman's legs in proportion as the blade penetrates between the obstetrician's fingers and the head of the fœtus. This movement of lowering causes the blade to traverse the axial line of the pelvic cavity; and the motion should be more complete the higher the head lies, and if this be at the superior strait, we must not hesitate to depress the perineum. The left blade having found its position at one end of the biparietal diameter, or simply at the left side of the pelvis, it must be confided to the care of an assistant, who is to hold it in a direction parallel to the right thigh of the mother. If this assistant should swing the handle toward the left thigh, the head of the fœtus, pushed along the pubic arch of the right side, might become an obstacle to the insertion of the second blade. For this reason the assistant must be intelligent, not jealous nor interfering. The instrument should therefore be held immovable in the position that the obstetrician himself has given it.

To insert the *right blade* the obstetrician will follow reverse rules, *i.e.*, he must hold it in his *right hand* and he must slip it along the *right side of the pelvis* exactly as he has done in the case of the left blade, taking the same precautions. Moreover, he must insert it in all cases *above the first*, so that the mortise will be adapted to the pin or pivot, but especially because the position given to the first blade forces the obstetrician to place, in every case, the second *above* the first blade.

*Second Stage: Locking.*—The two shanks having been placed upon the same plane by lowering the right blade to a level with the left, gradually approximate the *mortise* and *pin*, and *lock*, taking care to turn the pin or pivot transversely.

What we have just said concerning the first and second stages proves, at least for these two stages, that the application of the forceps is much easier than the corresponding stages in version. Is it not easier, indeed, barring exceptional cases, to introduce and fix the blades of a forceps, than to introduce the hand within the womb and search for the feet? And the

<sup>1</sup> *Gauche*, the word here translated left, means in French left and awkward both.

second stage, occurring outside of the uterus and the vagina, can it be compared in difficulty with the foetal movement which is to be induced in the performance of version?

Before beginning the third stage we are to assure ourselves that the head is *firmly seized* and that the head *alone is grasped*. Touch on the one hand, and slight pressure upon the extremities of the handles on the other, will assure us on these points. We must also be careful that no skin or mucous membrane is pinched by the lock.

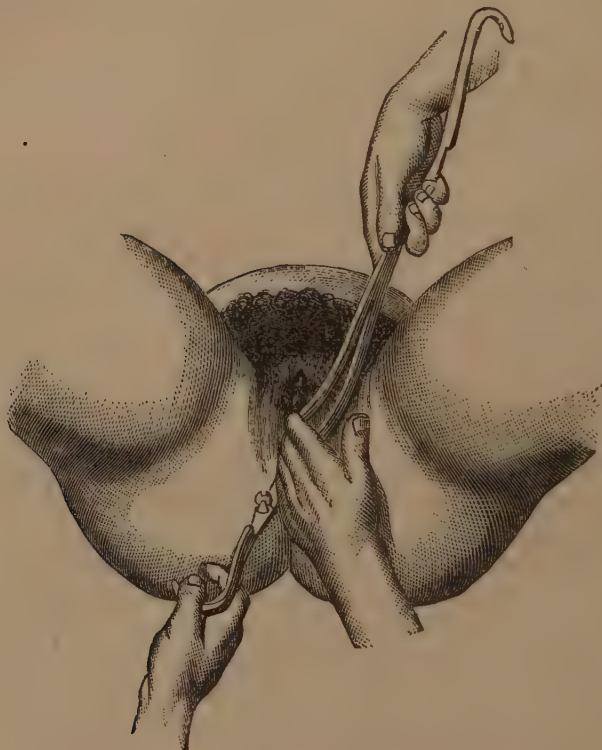


FIG. 83.—First Stage. Introduction of the second blade of the forceps.

*Third Stage: Traction and Delivery.*—We prefer the word *traction* to extraction, the latter word being reserved for version. After having given a few moments of repose to the woman, we may, if necessary, administer a few whiffs of chloroform, and profit by a contraction (if these exist) to commence pulling.

The forceps is to be held with both hands; in applications at the superior strait the left hand may be placed near the lock, the fingers beneath it to hold it firmly, the right hand being near the ends of the shanks, the fingers being above. Thus the instrument will act as a powerful lever, and traction is to be made with great slowness, aided or not by a

slight lateral motion. *Never*, however, perform any rotary movement, since this is harmful to the integrity of the vaginal mucous membrane.

We must pull with the arms only ; do not take any point of support, except in those very rare cases where great force is absolutely necessary. In a word, it ought not to be forgotten that the forceps is not destined to compress, nor to reduce ; at the most it may compensate for its thickness by the reduction which it induces. For this reason the thin and flexible forceps that we have advocated is an excellent instrument.

The only two methods of vertex delivery in natural labor occurring in the secondary positions called *occipito-pubic* and *occipito-sacral*, any application at the superior strait should endeavor to bring the occiput either in front or behind, but preferably in front. The same may be said for oblique positions, as we shall see further on.

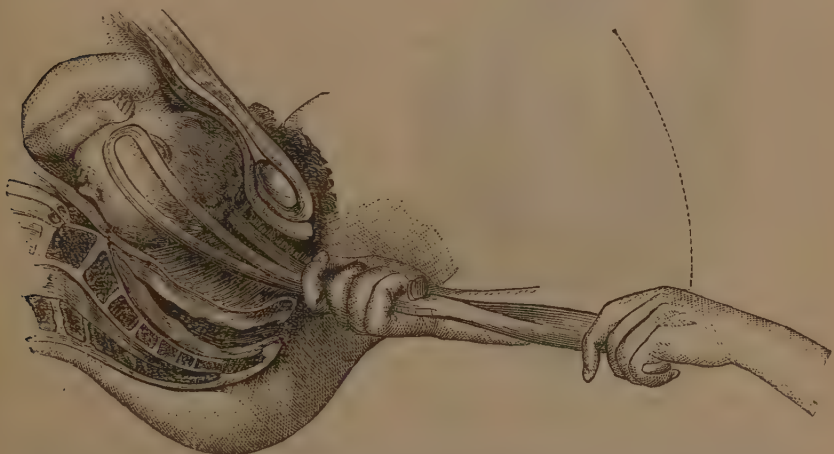


FIG. 84.—Third Stage. Traction at the superior strait. (The position of the hands is contrary to what has been described, but the broken line indicates the direction in which the obstetrician has to act.)

The occipito-pubic position having been made out, traction should be made downward until the occiput is delivered underneath the symphysis pubis ; then the obstetrician, placing himself toward the right side of the mother and leaning over, must lift the forceps with his left hand *toward the abdomen of the mother*, while with his free right hand he sustains the perineum, or simply prevents abrupt exit of the head by means of his thumb.

If, on the other hand, a head be delivered in the occipito-sacral position, we must first make traction upward with the forceps, and then, the occiput having engaged at the anterior commissure of the perineum, we must lower the forceps between the woman's legs to produce the movement of extension from above downward. In Tarnier's operations, while the occiput glides over the perineum and greatly distends it, the region

near the anterior fontanelle and the front of the forehead are delivered ; once the occiput is out, the head executes its movement of extension from above downward with the anterior commissure of the perineum as the centre of the movement, that point also serving as a fulcrum for the sub-occipital region ; hence it is by the sub-occipital diameters that delivery occurs, the chin remaining last underneath the pubis.

[In no instance would we recommend delivery of the head by means of the forceps past the *vulva* outlet. The forceps should be removed as soon as it is manifest that detention of the head by bony obstacle no longer continues. This advice being given in the interest of maternal soft parts. —Ed.]

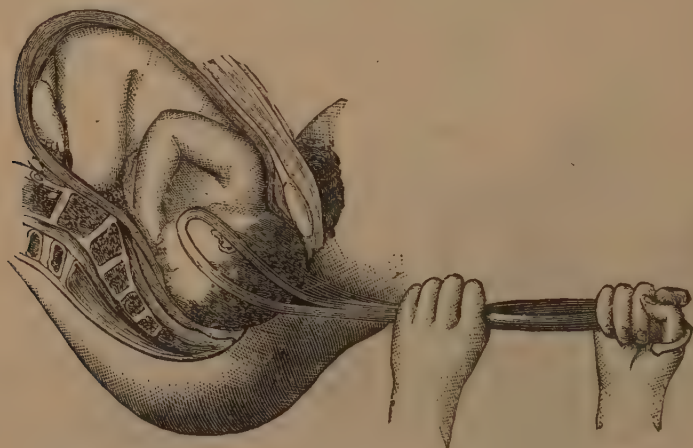


FIG. 55.—Third Stage, further advanced. The movement of extension is beginning.

In applications at the superior strait—if the usual irregularity of the application has not been rectified, that is to say, if the head has not turned within the blades, like an olive in the neck of a bottle into which we wish to bring it—we must, when the head is upon the perineum, redouble our precautions and employ touch to recognize the position of the fontanelles, and then, if the irregularity is not too great, we may, as a usual thing, deliver the occiput underneath the symphysis by a slight movement of inclination of the instrument ; but in all applications that remain transverse two cases usually present themselves : 1. Uterine contractions still exist. 2. They have ceased. In the former case the most prudent conduct will be to unlock the instrument and to take it off, following the axis of the pelvis, and abandon labor to nature. In the second case, after having taken off the forceps it is better to make an oblique application ;—this we shall consider further on. The same conduct is necessary where the diagnosis has not been made before the instrument has been applied.

*Remarks.*—According to the mechanism of natural labor, it is easy to



understand why, in direct applications upon a head which presents by the face, if the chin is underneath the symphysis pubis, the rules of the application and for traction are the same as for the occiput, since the chin thus serves as a landmark, replacing the occiput. Once the chin engages underneath the symphysis, the forceps is lifted to produce a movement of flexion, opposing the primary movement of extension. But in those cases where the chin remains behind, delivery becomes impossible for the reasons we have already given in natural labor (*q. v.*). We shall indicate what conduct is to be followed in the paragraph devoted to "oblique applications."

In breech presentation following version or spontaneous evolution, the head of the foetus may, after rotation, be retained in the pelvis, so that the forceps becomes necessary. Here the application does not differ from direct applications; we must, however, take the precaution, if the occiput is underneath the symphysis pubis, to have the trunk of the foetus lifted by an assistant, and slip the blades of the instrument over the sternal plane of the foetus. Delivery occurs exactly as in spontaneous delivery, *i.e.*, the chin comes out first at the perineal commissure. If the occiput is behind the foetus will probably be dead before we undertake the extraction of the head; then, without hesitating, we may swing the occiput forward. But if the foetus is living we must hasten to terminate labor with the forceps applied by the rules given, according as the head is flexed or extended; only in the latter instance may the forceps be slipped over the *dorsal* plane of the foetus, so that the movement of bringing the belly of the child upon the belly of the mother can be better executed.

*Note.*—When possible we always prefer manual delivery. If the head is retained in the superior strait, we must have recourse to the forceps to perform the manœuvre called *Champetier de Ribes' manœuvre*. (This we have already described under the head of version, *q. v.*)

§ 2. OBLIQUE APPLICATIONS OF THE FORCEPS.—*Rules.*—Whenever the occiput in a vertex, or the chin in a face, presentation, does not execute its movement of anterior rotation, which should bring the occiput or chin underneath the symphysis pubis, and when interference is necessary, an oblique application of the forceps is to be made. Concerning this we shall give the rules which are applicable in all cases (mento-posterior face positions being excepted), even when the trunk is out and when manœuvres have been ineffectual in bringing the occiput forward.

First, let us state that there are three things that must never be forgotten. 1. Try to seize the head by the ends of its *biparietal diameter*. 2. Always turn the upper concavity of the forceps toward the foetal part which you wish to bring forward. Now, in anterior positions the *occiput* is to be brought forward; but in *posterior positions* opinions differ widely. According to Pajot, it is the *forehead* that has to be dragged behind the symphysis pubis, and delivery is to occur by the occipito-sacral. But

within the last few years a revulsion of opinion has occurred, based upon the greater frequency of spontaneous reduction in posterior positions. Reduction with the forceps is now being attempted before swinging the occiput into the sacral concavity. Pajot himself admits the excellence of this plan; besides, the application of the forceps is the same, and we must then turn the superior curve of the instrument toward the *forehead*. 3. In applying the forceps *never turn the superior concavity backward*, in spite of the fact that some obstetricians follow this rule, for the concavity is for adaptation to the anterior curve of the pelvic canal.

To understand oblique application, let us suppose the pelvis divided by its oblique diameters, and let us begin with the left oblique. Besides, we know that with the simplified classification in actual primitive positions, the occiput or chin is always in relation with one or other of the extremities of each diameter.

LEFT OBLIQUE APPLICATION.—If we take for the first example the left oblique diameter, we find that the corresponding application will serve to extract the foetus placed :

1. In the first position of the vertex, L. O. A.
2. In the second position of the vertex, R. O. P.
3. In the second position of the face, L. M. A. (We except the first position of the face, R. M. P.)
4. In the two left transverse positions of the vertex and face that necessitate an oblique application of the forceps, as in corresponding anterior positions.
5. And finally, after exit of the trunk, when the occiput has turned toward the left side of the pelvis, by insinuating the blades along the sternal planes of the foetus and by having the trunk swung toward the side to which the occiput is directed.

All such cases are to be terminated by a *left oblique* application, in which, the forceps being locked, the superior concavity of the instrument will be turned toward the left thigh of the mother, and consequently toward the side of the foetal part which is to swing forward; the left oblique diameter of the pelvis will then pass between the two blades of the forceps. In oblique applications Pinard teaches that the blades of the instrument must be placed in the *empty oblique* diameter. Now, in L. O. A. and other positions the right oblique diameter is the empty diameter. This method of expressing a correct idea has the disadvantage of confounding, in the student's mind, right and left oblique applications.

We prefer to remember the old formula, "*seize the foetus by its ears*." It is evident that to do this the forceps must be applied in the empty oblique diameter, but the application will be none the less a left oblique application, *i.e.*, the superior concavity turned toward the left, and the left oblique diameter of the pelvis passing between the blades of the instrument.

In order to understand the exact manner in which the head of the foetus is seized, we may, before applying the instrument, hold it locked in front of the symphysis pubis, turning the superior cavity toward the occiput or forehead. In this manner it will be seen that in left oblique diameters the left blade will be below and the right blade above.

*Manual Operation.*—First Stage. The left blade is always to be first inserted as has already been stated, but directly downward. The right blade, introduced on a level with the right sacro-sciatic ligament, follows a kind of *spiral* movement from below upward, preceded and accompanied by the two fingers of the left hand, or better still, by the entire hand except the thumb, as Pinard advises. (See Art. "Forceps," in "Dictionary of Medical Sciences.") The hand is inserted so deeply that the fingers pass the uterine orifice and there remain, until the right blade is definitely placed upon the superior extremity of the biparietal foetal diameter.

Second Stage. Lock as in direct applications. When the pivot is within the mortise it should be turned toward the left thigh of the mother.

Third Stage. When the head is upon the perineum, it is necessary to give to the forceps a movement of rotation from left to right of the mother, which swings the occiput underneath the symphysis pubis, in the first position of the vertex; and from right to left in the second. This movement being accomplished, the pin or pivot is to be turned upward as in direct applications for the former instances, below in those cases when the occiput was primarily behind. We may in addition make an examination by means of touch to enlighten ourselves as to rotation of the head; the maximum intensity of the heart-sounds in the anterior occipital positions was in the left iliac fossa before this movement occurred, but will afterward be in the median line; then we may continue traction and delivery in the occipito-pubic, or in the mento-pubic, according to the case, acting absolutely as in direct applications, since artificial rotation merely transforms an oblique into a direct position. In positions *becoming* oblique or transverse *after* the exit of the trunk, rotation will similarly occur, and delivery is to be performed as in version.

In posterior positions, if the movement of rotation forward has not occurred swing the forehead beneath the symphysis and deliver the occiput at the anterior commissure of the perineum. If, on the other hand, the occiput has been swung forward, since the superior curve of the forceps will be turned directly backward, we advise unlocking and a direct application to end labor without any danger.

RIGHT OBLIQUE APPLICATION.—This application serves to extract a foetus placed according to the right oblique diameter in the pelvis, that is to say:

1. In the third position of the vertex, R. O. A.
2. In the fourth position of the vertex, L. O. P.
3. In the fourth position of the face, R. M. A. (We reserve, however, the third position of the face, L. M. P.)

4. In the two right transverse positions of the vertex and face, the application may be again right oblique, as in the anterior.

5. Finally, in positions that are transverse or oblique, after exit of the trunk, when the occiput has turned toward the right side.

The forceps, placed in the empty oblique diameter (the left) and holding the foetus by the ears, will have its left blade above, and the superior concavity and pin turned toward the right thigh of the mother; the right oblique diameter of the pelvis will pass between the two blades of the instrument; and this it is which characterizes a right oblique application of the forceps.

*Manual Operation.*—First Stage. We may indifferently apply the right or the left blade first, but it is the latter which is to describe the spinal movement already referred to, accompanied by the fingers of the right hand; it will curve around the foetal head and become fixed upon the superior extremity of the parietal eminence. The right blade, on the other hand, will be pushed directly down so as to embrace the lower parietal eminence. If it has been inserted first we must have recourse to *crossing of the handles*, since the pivot will lie above the mortise.

Second Stage. Once locked, the superior curve and the pin, as we have said, will always look toward the right thigh of the mother.

Third Stage. Rotation will here occur from the right to the left, in order to swing the foetal part forward. This part will (as in the preceding instance) have but a quadrant of a circle to swing through, and once this movement is accomplished the pin and the curve will be turned upward, and the application having become direct, will terminate as we have already described, according as the trunk is within or without the uterine cavity.

In the fourth position of the vertex—L. O. P.—the conduct of the obstetrician is to be the same as that indicated in left oblique applications for R. O. P. positions, but rotation will occur in a contrary direction.

DOUBLE APPLICATIONS.—We have, it will be seen, made exceptions for the two mento-posterior positions of the face; we may also add those positions which have become mento-sacral.

Indeed, in these three cases, spontaneous delivery being impossible unless the movement of rotation forward occurs—since the chest of the foetus cannot engage with an extended head in the pelvis, and since the neck is too short to traverse the inclined plane formed by the sacrum and distended perineum—we must, *from absolute necessity*, swing the chin underneath the symphysis pubis if it does not come there itself.

To do this we need a straight or a very slightly curved forceps, for the superior curve of Levret's forceps cannot, as we have said, be turned in any direction but that of the pelvic axis, and then, after having regularly seized the head, we are to give it with great slowness the necessary movement of rotation, so as to transform it into a mento-pubic position. This movement, however, is very dangerous for the foetus when the membranes



have ruptured, the liquor amnii has long escaped, and the womb has contracted upon the body of the child. Then, indeed, the trunk does not always follow the rotation that the head undergoes, and we risk a rupture of the spinal cord of the foetus. Indeed, the child is usually delivered dead or nearly so.

But very few possess the straight forceps, hence this manœuvre must be executed with the ordinary curved forceps, and this is to be done by means of two successive applications, as we shall soon describe.

Let us take for example the first position of the face, R. M. P., which is the most frequent.

In an ordinary application we must turn the curve of the forceps toward the chin which is to swing forward. But the chin is behind, and the superior curve not being capable of being turned backward, we must resort to a device to change the position of the foetus. Of course, if this position has been recognized in the superior strait, cephalic reduction, or podalic version, should have first been attempted by means of the hand.



FIG. 86.—The Small Straight Forceps.

To change the position of the foetus *after engagement*, a first application of the forceps (left oblique) is necessary, during which the superior curve is to be turned toward the forehead of the foetus. Then give to the head a very slow movement of rotation on the spot, and this will result in bringing the forehead nearly on a level with the left sacro-iliac synchondrosis, and consequently the chin of the foetus to a point quite close to the right cotyloid cavity of the mother. Then hold the forceps locked in this position for about ten minutes, and give the trunk time enough to follow the movement of the head's rotation, and to prevent the womb, which holds the trunk immovable, forcing the chin to turn backward, an event that might happen. Finally, unlock the instrument, following the axes, and terminate the operation by a right oblique application as in right *mento-anterior* or *mento-transverse* positions.

The third position of the face, L. M. P., will demand for similar reasons: (1) A right oblique application; (2) a left oblique application, the same precept being followed as we have just enunciated.

In a multipara, when the vagina is large and the forceps is slightly curved, we may at the first application bring the chin underneath the symphysis pubis and end by a direct application, as we have indicated for occipito posterior positions.

When this bold manœuvre is undertaken the head does not exhibit such a tendency to turn back when it is held with the forceps, and the second (direct) application can sooner be made.

In the mento-sacral position, the first application will also be direct, but I prefer before this to try and bring the chin forward either with the lever, or by apposition of the finger according to the method advised by Tarnier for posterior positions.

In case the foetus is immovably wedged in the pelvis, or if the death of the foetus is known before the operation, craniotomy, or, if necessary, cephalotripsy, is preferable.

§ 3. COMPLICATIONS AND DIFFICULTIES RELATING TO USE OF THE FORCEPS.—As in connection with version, these difficulties have been classified by Professor Pajot according to the three stages of the operation; but they are less serious than those we have given for version.

*First Stage.*—1. *The position has not been made out.* Then make a direct application. If rotation of the head has not occurred, it sometimes happens that it executes this after introduction of one blade, which then serves as a lever, or it occurs between the two blades, or again the head turns and the forceps with it. If the movement of rotation does not occur, a direct application would be irregular, yet delivery may be accomplished, notwithstanding. Besides, when the head has reached the vulva, we may, by means of touch, recognize the position, and if the application was irregular we may unlock and abandon expulsion of the child to uterine contractions, or make an appropriate oblique application.

2. *The second blade cannot be inserted.* This is quite a serious difficulty. In oblique applications, indeed, there is always one blade that is the more difficult to place; this is the *anterior* (the *right* in the first and second positions, the *left* in the third and fourth positions). Knowing *a priori* this difficulty, Depaul says that in the first and second positions of the vertex we should begin by inserting the *right blade*, contrary to the general rule.

This advice, besides being an excuse for *lapsus memoriæ* for the student, gives rise to another difficulty. Indeed, the right blade being first inserted, as the second blade ought always to be applied, underneath the first, it may happen that the pivot will be underneath the mortise, and then we cannot lock the blades. Then we will have to cross the shanks to pass the pivot-blade underneath the mortise-blade. This crossing, harmless in a multipara who has a large and distensible vulva, may induce great pain and a few slight tearings in the primipara's vulva, but such accidents may usually be avoided by considering the application of the right blade first of all as an exception, and not as a rule.

Indeed, the impossibility of placing the second blade occurs most often from the left blade, which has already been introduced, slightly lifting up the head of the foetus and pushing it close to the descending ramus of the

right pubis, so that the space for the reception of the right blade is insufficient.

This application was met with very frequently by Baudelocque, who, in cases such as we are discussing, placed the second branch of the forceps directly upward. But since Lachapelle has advised the introduction of the second blade in front of the sacro-sciatic ligament, whence by a long spiral movement it is led into its final position, the head leaves the pelvis and the above-named difficulty is obviated. It may be stated that we meet with this difficulty only in about twenty-five per cent. of cases; hence there is no need to create this difficulty of crossing the blades, and it is better to follow the rule given by Pajot, *left blade always the first*, at least in left oblique applications. If, finally, we cannot succeed in placing the second blade, then comes the exception which proves the rule: *We must take out the first and commence with the other*, then cross them.

*Note.*—Crossing may be avoided by means of the double pin- or pivot-forceps, but this is not used in France. It has been said that the lower pin or pivot may, in rare cases, wound the mother when the lock is within the vagina.

3. *The blade strikes against some obstruction.* This obstruction may be the sacrum if the blade has been wrongly inserted. It may be the shoulder of the foetus if the head is slightly inclined, or its ear may be encountered in the spiral motion; finally, if it has not penetrated the womb the end of the forceps may be arrested by the vaginal *cul-de-sac*.

In every case *avoid force*. Pull out the blade a little and direct it anew.

Pajot is right when he says in this stage we ought never to employ force; the blade should, so to speak, be introduced from its own weight, the hand simply acting as a guide; it is well placed when, on gently pushing it, it is felt to readily penetrate a little deeper than before.

*Second Stage.*—*We cannot lock.* There are three reasons that prevent locking. First, because *the pivot and the mortise are not upon the same plane*; this results either from the inferior blade being introduced too low or the superior blade not having completely finished its spiral movement. In such cases gently twist the blades so as to bring the pivot and the mortise on the same level, and lock. The second cause that prevents locking is *where one blade is inserted deeper than the other*. Then pull out the deeper blade and push the other a little forward; in other words, grope or feel your way. Finally, the third cause is *considerable divergence of the handles, so that they cannot be approximated*. This divergence may depend upon the head being irregularly seized (in its occipito-frontal diameter); or because the elevation of the foetal part on one side, and the presence of a sero-sanguineous tumor upon the other, prevent the head from being seized except by the *very tips* of the forceps. Then we must introduce the two blades deeper, taking great precautions, and moving only in the direction of the axes. We must not fear, in some cases, to



push the lock within the vagina itself, and we thus oftentimes avoid an almost certain slipping of the instrument when we first begin pulling upon it.

In certain cases of absolute impossibility of locking, if rapid extraction of the fœtus is indispensable we can arrange a provisional lock with a string, napkin, etc., the lock being further strengthened by the obstetrician's hand; great precautions, however, are to be taken when we pull. After the first tractions it often happens that the pivot and mortise approximate, and then we can lock the forceps in the usual way.

*Third Stage.*—1. *The head remains immovable in spite of energetic traction.* After the first fruitless application, take out the instrument and apply it again two hours afterward. If this second application is still unsuccessful, commence a third, waiting again two hours. But after three applications give up the forceps; and since the interests of the mother ought then to guide the obstetrician, and as, in the majority of cases, the life of the fœtus will then be compromised, we may perform perforation of the cranium and cephalotripsy.

Depaul prefers to terminate such difficult labors by the forceps at *one séance*. To do this he employs an ever-increasing force, performing traction by means of two assistants, harnessed, so to speak, to the forceps and braced against the bed. Such force, not regulated by a dynamometer, seems to me to be dangerous for the mother and without advantage for the fœtus, which, when born living, nearly always dies after a few breaths. (See observations in Bailly's thesis, 1866, "Use of Force in Labor.")

2. *The forceps slips.* If we have followed the precept given, viz., to pull only with the arms, the slipping of the forceps will be readily felt, and we may stop to fix the instrument firmly. But if one pulls with the body the forceps will slip abruptly, tear the maternal parts, and the obstetrician will tumble backward with the empty instrument in his hands.

3. *When we are not sure of the position.* We have already said that we must redouble our precautions, search to discover the position when the head arrives at the vulva, and unlock if we are still in doubt and if contractions persist. Our conduct must be the same if the head has been irregularly seized.

4. *The perineum threatens to rupture, in spite of slowness and of all precautions advised.* In such cases it has been advised, in order to avoid a more or less complete rupture of the perineum, to cut the sides of the vulva below by means of two little incisions made with the blunt scissors, performing the operation at the moment when contractions occur, the vulva then being dilated and thin. This method, very useful in many cases, may induce relaxation of the vulval orifice; it should only be employed with caution. Usually cicatrization of these cuts occurs rapidly, since, being outside of the median line, they are less bathed in blood and pus. It is very different when the perineum is ruptured.



Tarnier, however, has advised in these cases to replace the two postero-lateral incisions by a single oblique incision upon the perineum.

Experience proves, indeed, that these little postero-lateral incisions, besides their unfavorable influence upon the conformation of the vulva, do not always prevent rupture, while this rupture is always limited by the thickness of the tissues if the liberating incision has been made obliquely upon the perineum itself. However this may be, we must practise either incision very cautiously.

5. *The extremities of the blades are still in the vulva after the head is delivered.* This often happens when the large forceps is used within the pelvis, or when a forceps has but a slight curvature. Then, to avoid rupture, we must unlock and take out the blades, one after the other, following the curved axis of the pelvis.

6. *The head is delivered, contractions cease, and the child is in danger.* Tell the woman to bear down; do not deliver the arms, but grasp the shoulders to produce an artificial movement of internal rotation, according to the primary position of the fœtus, and then extract the trunk, *slowly pulling directly downward* and carefully watching the perineum.

*A Peculiar Form of Application called "Hatin's Application."*—Hatin proposes, in special cases, to use one hand to guide the two blades of the forceps upon the sides of a movable head situated at the superior strait.

His method consists in introducing *one entire hand* into the uterine cavity to determine application of the blades, and in using the other hand simply for the introduction of the blades.

During introduction and fixation of the left blade, the hand which is in the womb, and which we will suppose to be the left hand, is to be held in a position of *forced supination*, and it will pass to demi-pronation during the introduction and fixing of the right blade, being carried behind the fœtal head.

If the right hand was introduced into the womb, it will pass from demi-pronation to forced supination.

In these two cases, the assistant who is to hold immovable the first blade that was introduced must not swing the extremity of the blade too near the median line, for this movement will carry the head of the fœtus to the right iliac fossa, and then the second blade cannot be easily introduced. These precepts have been formulated in an exact manner by Felix Hatin; but before him Flamant and Baudelocque had spoken of the necessity of sometimes introducing the whole hand into the womb in order to fix the forceps; and Hubert (of Louvain), as early as 1845, that is to say, six years before the presentation of Hatin's "*Mémoire*" to the Academy, gave rules for the application of the forceps by means of one hand, according to the different positions of the fœtus.

The cases in which it is desirable to use Hatin's method are quite numerous. Whenever the head is movable above the superior strait, and

when we have *reason to prefer forceps to version* ; or again, after detruncation when the head remains within the womb, its elevation, and above all, its mobility, are causes for the employment of his method when ordinary proceedings fail ; then the head must be fixed as firmly as possible by pressure upon the supra-pubic region, and Hatin's method is to be employed for seizing and extracting it by means of the forceps.

I have myself chosen this method to make an application at the superior strait in a case of abnormal implantation of the placenta, and it was successful. (*France Médicale*, 1864.)

When the maternal parts are swollen and tumefied on account of the length of the labor and attempts that have previously been made, we may again, instead of passing both hands into the vagina, finish at once by employing Hatin's method, even when the head is in the pelvic cavity.

*Advantages and Dangers of the Forceps.*—When well handled the forceps wounds neither mother nor child, and it has the advantage of not occasioning an afflux of blood to the foetal head, as version does. We have seen that the first two stages of this manœuvre are more simple than the corresponding stages of version. But badly introduced or abruptly withdrawn it may tear the vagina, separate it from the womb, especially near the posterior *cul-de-sac*, lacerate the uterine orifice, perforate the womb, rupture the perineum, contuse the vulva, and induce scars and fistulæ within the vagina. (Budin's "Traumatic Lesions," 1878.) Badly applied it may not only contuse but even crush the head of the foetus ; or when too tight it may induce fracture ; and if, as some authors advise, it be applied upon the podalic extremity of a living foetus, it may in inexperienced hands produce the gravest consequences.

Consequently we may say that the application of the forceps, especially at the superior strait, is not an indifferent operation, and that we should not perform it until there is good reason for it. To operate skilfully requires a great deal of instruction, a great deal of practice, and a great deal of care. Force is also necessary, and this is not, as a general rule, possessed by midwives ; hence, the French law has done well to exclude midwives from the practice of this operation, for the application of the forceps in a goodly number of cases may be considered as one of the great surgical operations.

*Remarks.*—In positions of the foetus at the superior strait I have stated that only direct applications are made (German method) ; such is also the rule in Paris. But as students become practitioners and, some of them, teachers in their turn, it is well that they should know that irregular oblique applications (*mixed applications*) may be employed even at the superior strait. In such cases if, because of such suitable reasons as a deformed pelvis, etc., version is not preferred, irregular oblique application (seizing the foetus from the posterior parietal region on one side to the anterior frontal region on the other) is an operation performed in

the interest of the child, and one which is not difficult. I have performed this several times myself, and in Belgium it is the adopted method.

#### ART. IV.—TARNIER'S FORCEPS.

In 1877 Dr. Tarnier, in a little pamphlet published in Paris, gave a description of two new forceps, one of which presented a perineal curve analogous to that of Morales' forceps, destined, according to its inventor, to facilitate traction in the direction of the axis of the pelvis. Both were provided with handles for traction inserted below the blades, in a point quite near the centre of the figure, and with a thumb-screw serving to fix the head of the foetus, while it left to it nearly as much mobility as it possesses in normal labor.



FIG. 87.—Tarnier's Forceps with the Perineal Curve.

From this latter disposition it follows that the movements executed by the head in the pelvic canal are transmitted to the handles of the instrument, which thus becomes a sort of indicator serving to tell us how traction should be made.

Experience has recently proved to the inventor that the advantage he hoped to obtain from the perineal curve of the instrument was theoretical rather than practical. Hence this curve has not been preserved, so that Pajot says that "Tarnier's forceps no longer exists." But the second forceps *does* exist with certain modifications, notably those made upon the curve of the tractors; they are the favorite instrument of the phalanx of students of the brilliant surgeon of the Maternity Hospital, and for these the complications of the instrument have been no obstacle to its adoption.

We must admit that it is a good instrument, nearly fulfilling the indications which the author had before him, but, like all instruments, it has both advantages and disadvantages. Concerning ourselves, we have al-

ready successfully used Tarnier's forceps (newest model) several times, but as a rule we have preferred the simple and handy forceps of Levret.

Tarnier's forceps is composed of two shanks of prehension and two branches of traction. The latter fit together by means of a sliding-bolt lying upon the extremity of a curved bar, into which a cylinder of wood is transversely inserted; this wooden handle is movable in every direction; above, these shanks lock at the inferior portion of the blades of the forceps; they are parallel, and by means of joint-pins they are attached to the prehension shanks, making, with the latter, one single piece, thus facili-

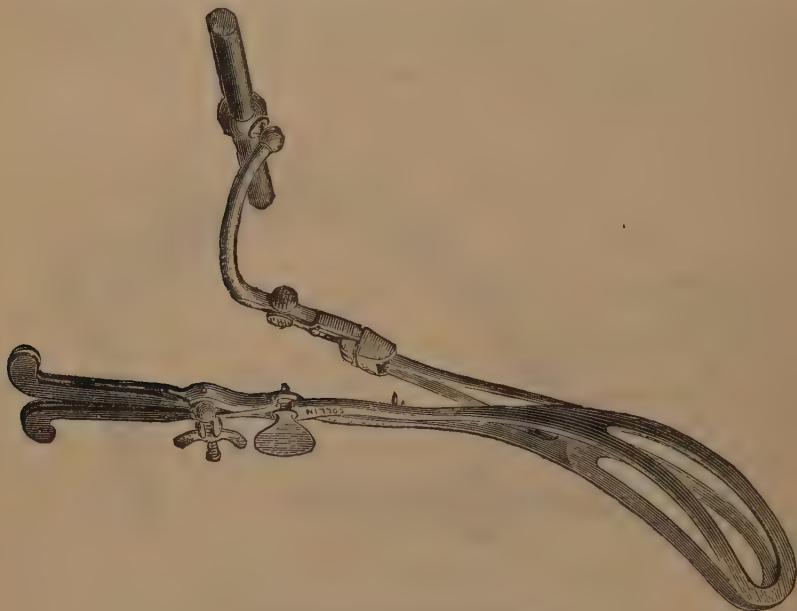


FIG. 88.—Tarnier's Forceps (last model).

tating introduction of the instrument. A thumb-screw holds the two shanks together, and assures solidity of the blades when these grasp the foetal head.

Thus modified the instrument is nearly as simple as the ordinary forceps; it is introduced according to the same rules. When the two shanks have been introduced the traction bars are fixed upon the metallic portion of the handle by means of the sliding-bolt, and then the wooden cylinder lies transversely. Before commencing traction we must carefully screw the bolt joining the two shanks so as to insure a solid and even grip upon the foetal head, and then both hands embrace the wooden handle, thus giving to the operator a very easy grip. During traction we must be careful to maintain the prehension and traction shanks apart at least by  $\frac{1}{2}$  in. Thus the first shanks, undergoing (outside of the body) movements corre-



sponding to those executed spontaneously by the foetal head within the body, serve as indicators to the obstetrician, who has only to follow these movements with the traction shanks, holding the latter always at least  $\frac{2}{3}$  in. away from the indicating shanks, never letting them touch.

Finally, we think that this new forceps will render great service to obstetricians, and, because of the slight force that it demands, it narrows the field of operation of the cephalotribe.

#### ART. V.—GRADUATED FORCE IN LABOR.

Graduation of force is only applicable to artificial means of delivery. In certain cases of deformed pelvis which are so marked that natural labor, or labor aided by a simple application of the forceps, cannot occur, but where a bloody operation is not advisable, the use of graduated force will be beneficial.

Indeed, either manual force will be insufficient, and the obstetrician will exhaust himself in useless efforts, or, on the other hand, great force coupled with that of an assistant will surmount a bony obstacle, yet will produce accidents that may be fatal for the child and sometimes for the mother.

Search for a method that might at the same time increase muscular effort and regulate the employment of force presented itself to the minds of obstetricians, and no one has gone so far as Dr. Chassagny (of Lyons), who has proven by a series of experiments the superiority of his method of continued traction.

This method is more efficacious and less dangerous when a dynamometer such as Joulin recommends is applied along with the instrument. All other obstetricians who have invented apparatus for traction have only modified more or less successfully the original idea of Dr. Chassagny, who is the father of this method. We have now to determine that the use of mechanical force in obstetrics ought to prevail in practice.

Let us first and foremost remember Lachapelle's advice: "In any obstetrical operation employ continuity, slowness, attention—even groping your way; these are precautions without which force never ought to be employed."

Are these wise principles followed in the employment of mechanical force? Dr. A. Guéniot read before the Society of Surgery in 1875 a very brilliant eulogy upon the method of continued traction; he gave a *résumé* in these words:

"1. Mechanical force may be legitimately applied to labor whenever, on account of exaggerated efforts, the operator is likely to become exhausted. 2. Unless we wish to abuse this useful aid we should stop all intervention of machines; and nearly always at a certain period of foetal extraction the indications will be to substitute for them manual force to complete an operation which they commenced."

Dr. Blot refuted the allegations of his colleague, which, he said, were too general. He feared that the support given by Dr. Guéniot to the use of force would lead to violence.

Professor Pajot, in a letter which appeared at the same time in the *Annals of Gynecology*, supported Dr. Blot. He closed his letter with this characteristic dilemma.



FIG. 89.—I., Poulet's tractor; II., the same taken to pieces; III., the blade of the perforated forceps.

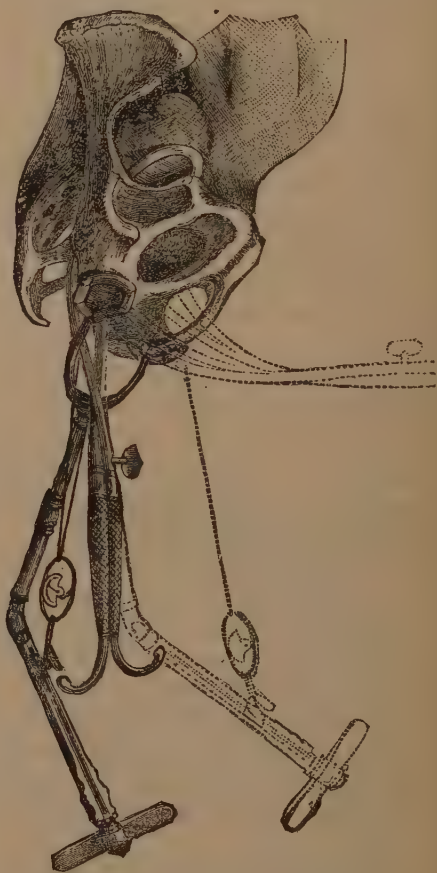


FIG. 90.—Poulet's Tractor applied.

"Your machines are encumbrances—they are not practical; there can be no discussion on that point. If your machines simply *do as much as the hands of the obstetrician* they are *useless*; if they *do more* they are *dangerous*. As to their being *better*, well-educated men who have a good deal of experience in obstetrics, such as Dubois and Velpeau, have already given their opinions."

However, rather to answer desires expressed by some readers than to

make our manual more complete, we shall here give a description of Poulet's tractor. Poulet previously invented a flexible forceps for independent traction, which is not used in Paris. We give the description quite willingly, since it presents some analogies with the *aide-forceps* of Joulin, which we have described in the first edition of this book. Like it it is composed of a long traction-bar but it has at its centre an elbow so as to change the direction of the traction; like the *aide-forceps* it has its resting-place upon the tuber ischii, but it is applied by at least two quadrangular rims of iron encased in rubber; in these spaces the ischia lie.

We saw this instrument at Dr. Delore's, in Lyons, who kindly explained the mechanism to us. It has the advantage of being reduced to a very small size, and consequently it can be readily transported. If we should recommend *any* mechanical tractor this is the one which we should prefer.

#### ART. VI.—THE LEVER AND THE BLUNT HOOK.

The lever or *vectis* was first invented by the Hollander Roonhuisen, a short time after the forceps, of which it seems an imperfect reproduction. We know that Chamberlain went into Holland to sell his instrument, after trying in vain to dispose of it in Paris. The secret of the forceps could not be well kept, and the lever was thus given as an instrument adapted to pry up the foetal head; besides, it was followed with rather good results before the forceps came into general use. The ancients used the lever very frequently, but the forceps has replaced it, at least in French practice; indeed, all the cases which would demand the lever are cases in which the forceps would be better. Dr. Tarnier, in his edition of Cazeaux's book, has tried to bring the lever into favor again. The late Dr. Marchant (of Charenton) has even written a treatise on the lever, in which he gives the rules for its application in the different positions; but I think that, wrong or right, the lever will never displace the forceps, one of whose blades alone can fulfil all of its functions.

The form of these blades, indeed, very much resemble that of the lever, with the sole difference that the single curve of the latter instrument is found upon the flat surface so that it may adopt itself to the convexity of the foetal head; the extremity is rounded, and it has a wooden handle. There are a great number of these instruments which differ in their curves, and on this often depends the greater or less facility of their application. The lever has been reproached as inducing frequent contusion of the urethral canal because of its application behind the symphysis pubis. Its incontestible utility consists in straightening the head or in inducing cephalic reduction in inclined positions of the cranium and face.

In Flanders obstetricians use a non-fenestrated lever, a sort of spatule whose blade—almost straight—makes, for four-fifths of its length, quite an abrupt curve toward its extremity; they are very successful with this in-



strument, especially in inclined positions. Boddaert (of Gand) praises the lever highly. Hubert, on the other hand, has proven that its action does not occur along the direction of the axis of the superior strait, and that the pressure it exercises upon the cranium of the foetus and upon the soft parts of the mother is sometimes more than that of the forceps, which elsewhere in Belgium, as in France, is preferred to the lever. (See Cazeaux, edited by Tarnier, for its method of employment.)

The blunt hook is, like the lever, an old obstetrical instrument. It con-

sists of a steel arm, usually cylindrical, curved, and rounded at one end, and ended at the other by a wooden handle.

To-day this instrument is found chiefly in obstetrical museums.

The blunt hook is applied over the inguinal fold in breech presentations when spontaneous delivery is impossible and when we must terminate labor without delay. It is also applied in the axilla, when, after exit of the head, the shoulders present great resistance to delivery. Finally, in certain cases of embryotomy it may serve to approximate to the vulval orifice a foetal part on which we wish to operate.

To use the blunt hook, hold it in the right hand and direct it upon the fingers of the left hand up to the level of the fold over which it is to be placed. A movement of rotation will then turn the *crochet* toward the fold which is to be seized, and the finger will discover whether it is regularly applied and whether it

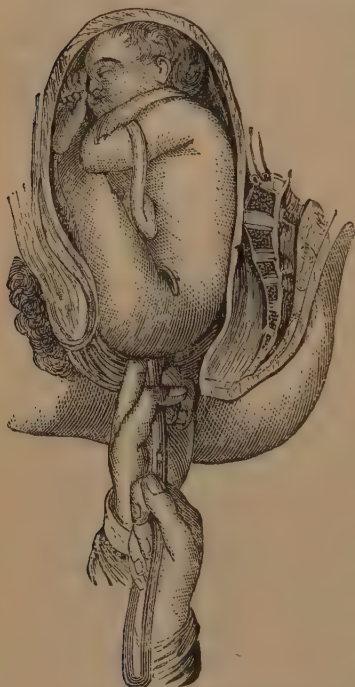


FIG. 91.—Application of the Blunt Hook over the Inguinal Fold.

compresses the umbilical cord of the foetal genital organs. For an application of the *crochet* to be harmless, the bulb of the instrument must pass the fold of the groin. I have seen injury of the inguinal tissues and arterial hemorrhage produced by irregular applications of the blunt hook. When well placed traction is induced slowly in the direction of the pelvic axis.

I ought to mention here a hinged blunt hook invented by Dr. Wasseige (of Liege), the various curves which the joints allow facilitating its introduction and its application in difficult cases, for then it can perform the same movements as could the finger of the obstetrician.

This instrument may also serve to carry over the trunk and neck of the foetus a cord to which is attached the chain of Chassaignac's *écraseur* in cases where it is necessary to practise embryotomy.



[We should advise against the use of any blunt hook upon a *living* child, the probability of fatal injury by it being so great.—Ed.]

#### ART. VII.—PREMATURE ARTIFICIAL DELIVERY.

Premature artificial delivery is an operation in which art induces expulsion of the foetus after the latter has become viable but before the ordinary term of pregnancy, with the double aim of saving mother and child.

Thus considered, premature induced labor is in perfect harmony with law and morality, and deserves to take rank with the forceps and version.

In 1756 Macaulay practised it for the first time, in England, and the works of Denman soon made this operation popular throughout Great Britain. Thence it passed into Germany, where it entered into ordinary practice long before Reisinger's work, published in 1820, rendered the operation classical. In 1830 Marinus (of Belgium) made this operation popular at the same time that Burckhardt, one of Stoltz's pupils, wrote, at Strasbourg, a remarkable thesis on the subject. Three years later the learned professor at Strasbourg (to-day the honored Dean of the Faculty of Medicine at Nancy) presented his "*Mémoire*" to the Academy, in which he related a number of successes which he had obtained since 1831.

From that period premature artificial labor was adopted in France, notwithstanding the rebuke that Kerkaradec's report to the Academy had given it, and despite Hatin's opposition and that of Baudelocque's students. The operation found able defenders in the works of Dezeimeris (1832), Dubois (1834), and Velpeau (1835), and later in the treatises of Jacquemier, Chailly, Cazeaux, etc.

What, then, are the cases in which the obstetrician may induce artificial labor, and what are the necessary conditions for its performance?

These two questions we must, first of all, endeavor to answer.

A. In 1827 Dr. Costa demanded of the Academy why labor should not be induced whenever an intercurrent disease of pregnancy rendered prolongation of the latter condition dangerous for mother and child. This proposition, rejected as unwise by the learned society, was taken up again by Dubois in 1847. This eminent professor published a work on the subject, wherein he stated that acute diseases—foreign to pregnancy—seemed to be harmfully influenced by abortion or spontaneous delivery, and in these cases he stated that it seemed wiser to abstain from all interference. In cases where the abdominal cavity is narrow the operation must also be rejected unless the mother be threatened with asphyxia. It is never to be performed when the foetus is dead within the uterine cavity and when the membranes are intact, for pregnancy may then be prolonged fifteen days and even three weeks without danger to the mother, for after a variable length of time contractions will arise and the child will be spontaneously expelled.

Those cases, on the other hand, in which Dubois did not object to the induction of premature labor are: in certain nervous diseases, such as chorea, especially when the muscles of organic life are involved. We know, however, that this professor afterward rejected, as part of the preventive treatment of eclampsia, the induction of premature labor, which he had formerly advocated. Some cases of very pronounced dyspnoea, dropsy of the amnion, abdominal tumors complicating pregnancy, or tumors that are immovable within the pelvic cavity, may also require the obstetrician to induce premature labor.

Finally, the operation must not be completely abandoned when several previous pregnancies have been accompanied by death of the foetus, unless, however, time presses, for we can always hope for a happy issue when we adopt a treatment in accord with the presumed cause of such death.

There are scarcely any who oppose premature delivery when there is uncontrollable vomiting from the commencement of the third period, and all are of one accord as to the beneficial results of this operation in deformed pelves.

*B.* Three conditions must necessarily be made out before bringing a living child through the maternal organs: 1, The condition of viability of the child; 2, the condition of the maternal organs; 3, the size of the foetus.

1. The viability of the foetus is announced by the period of pregnancy, the general health of the mother, the integrity of the ovum, the regularity of the heart-beats, and the existence of active movements of the foetus.

Experience proves that at seven months the foetus is scarcely capable of assuming this great function. Some facts, however, seem to prove that at six and a half months at the earliest the child can live; but such cases are very rare, and any operation performed before the seventh month of pregnancy to free the uterus from its product of conception must be considered as an abortion.

In cases of obstinate vomiting the benefit of premature delivery is admitted. We must commence early, that is to say at the beginning of the third stage or end of the second, in the interest of the mother and also in that of the child whose existence may be compromised by too long a stay within the womb. Finally, if death of the foetus during several former pregnancies makes us fear a like accident we should induce labor—not, however, unless the active movements as well as the heart-beats are normal; in other words, we are to reject the operation when the foetus is dead and when we judge that its condition will not allow it to endure the performance of labor.

As to other causes which militate against the chances of the child's life, since they are outside of all our knowledge the obstetrician need not take these into consideration.

2. The condition of the maternal organs ought to be known by the ob-

stetrician who proposes to introduce premature artificial labor, especially if there is—what is usually met with—a deformed pelvis. We must then know the measurements of this pelvis; hence we must use the pelvimeter as already described in previous pages. Touch will likewise enable us to appreciate the condition of the pelvic cavity, the possible presence of a hard or soft tumor, its size, resistance, and, in case of a pediculated tumor, the movability thereof.

3. Finally, as to the size of the fœtus. Is the fœtus a monster? Has it hydrocephalus? Is there a breech presentation along with a deformed pelvis?

To the first two cases may be applied what we have already stated concerning deformed pelvis; in the last-named instance it will perhaps be well to try cephalic version by means of external manipulation before or at least during the operation. But it is especially the size of the fœtal head that must always be made out when we wish to pass this head into and through a narrow pelvis. Of all the diameters of the head the most important is the biparietal, which, especially in deformed pelvis, is nearly always in relation with the sacro-pubic diameter. Now, here is an unknown problem, difficult to solve, for no two children are of the same size, and we cannot in this connection make any deduction as to the maternal forces; only in multiparæ can the size of former children become an index for the size of that which is now within the uterine cavity. With this cause of uncertainty comes also the question of reducibility of the bones of the cranium, which is not the same in all children, and the degree of energy of uterine contractions.

Statistical works have undertaken to establish, as far as possible, the extent of the biparietal diameter at the different periods of pregnancy. We shall only give those of Dubois. This great physician has proved that it measures at 7 months  $7\frac{1}{2}$  in.; at  $7\frac{1}{2}$  months,  $3\frac{1}{10}$  in.; at 8 months,  $3\frac{2}{5}$  in.; at  $8\frac{1}{2}$  months,  $3\frac{3}{5}$  in.; and that the reducibility is greater in proportion as pregnancy is *less* advanced.

The obstetrician will, then, be obliged to depend upon such statistics, for it is impossible to measure the fœtal head. In some cases, however, touch may reveal at the fundus of the vagina a tumor formed by the fœtal head, greater or less in size, but that is all; and again, in cases of deformed pelvis where this appreciation would be useful the elevation of the fœtal part will render any search in this respect perfectly useless.

But the obstetrician, having obtained by some process of pelvimetry already referred to the extent of the antero-posterior diameter of the pelvis, may compare it with the presumed dimension of the biparietal diameter of the child and determine the time suitable for artificial delivery, taking into consideration reducibility of the head. For example, a pelvis measuring  $2\frac{1}{5}$  in. along its sacro-pubic diameter (proper reduction having been made for the obliquity of the sacro-subpubic line if we have em-

ployed digital pelvimetry), we must induce labor at seven months because : 1. It is the furthest period from full term of pregnancy which affords the child any chance of living. 2. The biparietal diameter of the fœtus being at seven months  $2\frac{1}{2}$  in., it may then pass, thanks to that reducibility which compensates for the thickness of the soft parts. Experience even proves that at this period of gestation reducibility may permit engagement when our estimate comes within  $\frac{1}{2}$  ctm. ( $\frac{1}{2}$  in.) of being the correct one.

Thus living children may be delivered in pelvis measuring  $2\frac{3}{4}$  in., but then they must present by the vertex.

In a less deformed pelvis,  $3\frac{1}{2}$  in. for example, Dubois states that in primiparæ—instead of inducing uterine contractions at seven months and three weeks, when the biparietal diameter of the fœtus is supposed to be  $3\frac{1}{2}$  in., or even at eight months, when this diameter may have a greater extent than that of the pelvis—it is better to allow pregnancy to go on to term, for there are women who have small children and energetic contractions ; besides, the forceps, if then called for, will terminate labor. I myself saw in 1867 a case which made me appreciate the justice of this opinion. A woman, small and rachitic, had a remarkably deformed pelvis, and the sacro-vertebral angle was readily felt. Learning this too late to propose premature delivery I waited, and delivery occurred spontaneously at term. The child was born living, but was a very small infant, with a size as follows : Occipito-frontal,  $4\frac{2}{3}$  in. ; biparietal,  $3\frac{1}{2}$  in. ; suboccipito-bregmatic,  $3\frac{3}{4}$  in. ; total length,  $18\frac{1}{4}$  in. It measured from umbilicus to heels  $7\frac{3}{4}$  in.

In a multipara whose previous labors have been difficult, the professor whom we have just cited advises us to have recourse to premature delivery. The woman who is the subject of the preceding paragraph two years later gave birth to a very large child, which it was very hard to extract, and I was obliged to call in Dr. Guéniot to aid me. The child died during labor.

It was only at the third pregnancy that the family decided to allow premature delivery. Unfortunately, this time prolapse of the umbilical cord was the cause of the death of the fœtus, which spontaneously presented the vertex. We ought to say, however, that the perfection of the processes employed to-day has rendered premature artificial labor so simple that the greatest number of obstetricians do not hesitate to perform it at eight months in primiparæ when the pelvis measures  $3\frac{1}{2}$  in. in the antero-posterior diameter.

**OPERATIVE MEASURES.**—Professor Pajot long since classified the methods employed in premature delivery into three classes, according as we employ *puncture, dilatation, or excitation*.

*First Class: Methods in which Puncture is employed.*—When Macaulay for the first time introduced premature labor, he simply punctured the ovum at its inferior portion. This puncture may be made either with the



finger, if the woman is a multipara and the finger can get into the internal orifice—which is partially opened—or with a stiff pointed instrument. This method, formerly employed, in most cases induced death of the fœtus, because the liquor amnii flowed away and consequently left the fœtus exposed during the whole period of labor to the full force of uterine contractions. Hence puncture has been specially reserved for abortion, and we know the sad results that have followed the abuse of this knowledge.

Meissner (in Germany) desired to perfect this process, and hence invented a *sonde à dard* by means of which we may puncture the ovum at its upper portion and let just sufficient fluid escape, that uterine contraction may be induced. This very ingenious instrument presents difficulties in its introduction, and the partial detachment of the membranes that it necessitates may lead to great dangers. One of our countrymen, Dr. Villeneuve (of Marseilles), has, however, modified it advantageously, and it is now less dangerous for the fœtus. I think that we can replace all these methods by capillary puncture with Dieulafoy's apparatus.

*Second Class : Methods in which Dilatation is employed.*—Struck with the disadvantages of puncture, Klugge, of Germany, proposed to introduce into the cervix uteri a piece of sponge prepared, as sponges are in surgery, to dilate fistulæ.

This simple method was a great discovery, and we can say that from that time premature artificial labor became an operation without any danger.

This is the manner in which we employ the sponge-tent :

After having applied a speculum we introduce into the cavity of the cervix, by means of a small forceps, a bit of prepared sponge shaped like a cone, and through whose base runs a string, the ends of which hang out of the vagina. This sponge is about two inches long. To facilitate the introduction into the orifice its point is usually greased with a solid cerate—far better than oil, since the latter penetrates so rapidly into the pores of the sponge that it often dilates it before it can be inserted ; then the operation becomes difficult. Once the sponge is inserted it is usually kept immovable by means of a second—ordinary—sponge, through which also a string is passed so that it can be drawn out at pleasure ; sometimes, instead of the second sponge, we tampon. The vertex of the sponge, by reason of its length, will not pass the internal orifice unless dilatation has commenced. In this way the dilating action of the sponge will only be expended upon the *cervical* region. We may also insert the sponge-tent by means of a curved forceps carried along the finger, without making use of the speculum. We prefer, however, to use the speculum, because the necessary feelings and gropings to find the orifice cause the sponge to remain so long in contact with the vaginal mucous that it softens and swells before we can introduce it.

By softening and swelling the sponge dilates when it is placed within the cervix, producing dilatation of the latter as well. It irritates it, and this irritation reacting upon the muscular fibres of the womb induces uterine contraction.

It is generally necessary to leave it in position for eight hours to obtain any result, but in some cases it must stay longer. It has happened that after having dilated the cervix the sponge has not awakened any contraction whatever in the uterus. Then it becomes necessary to introduce a larger sponge than that first inserted, or to employ some other method for provoking labor. Ergot or rupture of the membranes may then be employed—*ergot* if the contractions are feeble and few; *rupture* if the orifice has been widely dilated by the sponge and if there are no contractions. When a second sponge is introduced, if the internal orifice has undergone a certain amount of dilatation we may place it so that the vertex of the cone penetrates within the uterine cavity, being careful to avoid rupturing the membranes. This portion of the sponge rapidly swells, and we merely have to maintain it in position with a forceps for a few minutes to avoid simultaneous tamponing; for the sponge then assumes the shape of a collar-button whose upper portion is within the womb, and it may resist traction made upon the string fixed in its base. The latter method of operating embraces both dilatation and excitation; indeed, forced detachment of the membranes and irritation brought about by the sponge acting like a foreign body complete dilatation of the internal orifice of the cervix and in nearly every case induce contractions.

Joulin (page 1108 of his book) describes a process in which the obstetrician himself prepares the sponges, and he places them above the internal orifice. To avoid too rapid softening, before sand-papering them down to the proper size he soaks them in a solution of gum Arabic and then leaves them to dry for several days.

Dilatation by means of the sponge is exempt from the disadvantages of puncture and from all the dangers of the other methods.

Why, then, do we not keep to this one method? Caprice, in science as well as in dress, has rushed to a "*method of excitation*," first resorted to in Wurzburg, viz., douches, of which we shall soon make mention.

The only serious objections that can be made to Klugge's method are the requirements of tamponing, and in cases of deviation of the cervix, difficulties in placing the sponge. Tamponing is a painful operation and may induce irritation of the lower segment of the uterus; but besides the fact that the tampon cannot be left in for a long time, by introducing a second sponge above the cervical orifice, as we have already said, we may thus avoid tamponing, making use of Cazeaux's forceps, held in by a hypogastric girdle. Some accuse the sponge-tent of being the cause of premature rupture of the membranes; this is not because of rapid softening of the sponge, but must rather be attributed to the inexperience of the oper-

ator. In 1872, however, in a woman in whom I induced labor, detachment of a placenta that had been inserted near the orifice was discovered, and consecutive hemorrhage had been produced by the sponge being placed upon the right side. I withdrew it immediately and placed the sponge upon the *left*, and labor went on without any accident whatever.

Busch uses a sort of three-pronged forceps which, closed, can easily penetrate the uterine orifice. Once introduced this forceps is gradually opened while it is made to rotate upon its axis, producing mechanical dilatation and inducing contractions, the result of the local pain which the instrument causes. This is far inferior to the sponge, but nevertheless may be used before the application of the latter.

[We are disposed to again raise a voice of warning against spongetents, expressing a preference for tupelo-tents. The former have too often produced dangerous and even fatal poisoning from decomposing blood and mucus held in their meshes. We would also oppose here the use of ergot in labor artificially induced until after *full* cervical dilatation.—Ed.]

In 1862 Dr. Barnes published a *mémoire* whose title was "A New Method of Inducing Premature Labor at any Period." His dilators consist of a set of rubber bags which somewhat resemble Tarnier's dilators (described later on). If Busch's dilator is useful at the commencement of labor, Barnes' had best be applied at the end of premature labor, to accelerate the *dénouement*. This instrument, like the spheno-siphon invented in 1835, like Mattéi's apparatus, used since 1855, has for its base a membranous pouch which is distended by an injection; this idea seems to have been present in Tarnier's mind when he made his new instrument, and which he calls the *intra-uterine dilator*. Barnes, in his "Lectures on Obstetrical Operations," translated by Dr. Cordes (Paris, 1873, p. 345), states that all the methods employed act by exciting a spinal nerve-centre, and he makes a long enumeration of them, which we cannot transcribe in this book.

*Tarnier's Dilator*.—Because of the unfortunate sequelæ that happened to several obstetricians who employed the vaginal douche, Tarnier in 1862 invented an instrument destined to dilate the cervix uteri. It is made up of a tube about the size of a goose-quill, having thick walls for the greater part of its extent, but thinned for  $1\frac{3}{8}$  in. at its extremity, which is formed and terminated by a small double lead bulb, through which passes a silk thread ten inches long. This thread helps to attach the tube to a curved, grooved metallic conductor, which carries the tube into the uterine cavity. Once the tube is fitted in place see that it will not slip out and that the bubbles of air which it may contain are expelled, and then place it in the groove of the conductor, dipping its end in glycerine. The pendent end of the tube is furnished with a stopcock. The woman being placed as for forceps application, the tube is slipped into the vagina, guided by the finger; then it enters the cervix, and, says the author, is readily inserted



into the uterine cavity, passing between the foetus and the anterior wall of the uterus. A little hiatus placed upon the conductor indicates that the blunt extremity has penetrated 3 ctm. ( $1\frac{1}{2}$  in.) above the internal orifice. Then, by means of a graduated syringe containing 50 to 60 grms. ( $1\frac{3}{4}$  to 2 oz.) of hot water, an injection is thrown through the pendent end, and the thin extremity of the tube swells into a bulb; then the string is withdrawn and the conductor taken out. The tube remains in place, held by the bulb, which dissects away the membranes and irritates the uterus. This organ begins contracting generally about eight hours after the injection. But some have said that this process has oftentimes taken much longer. In such instances a second tube must be introduced and the operation commenced over again. Joulin states that Tarnier's dilator does not act upon the cervix, and when the orifice is dilated enough to allow the bulb to escape the former author says that contractions cease. Moreover, the bulb often bursts, because of the rapid changes in the rubber. We have also to fear, in the use of this instrument, perforation of the membranes at the moment when the conductor is introduced; and I have often seen the swollen bulb cause transformation of a *vertex* into a *shoulder* presentation. Finally, are we always sure that we do not injure the uterus in thus introducing a rigid instrument into its cavity? I know of a very grave case of perforation of the uterus, which occurred in the hands of one of the most experienced obstetricians, which may be adduced *apropos* of this question. A better objection is the difficulty that we experience, especially in primiparæ who are at their seventh month of pregnancy, or again when the orifice is agglutinated, in inserting into the uterine cavity a tube whose size is augmented by that of the conductor. To obviate this I have proposed a "mixed method," modifying Tarnier's dilator; this I shall describe after the methods of excitation are discussed.

In 1876 Dr. Chassagny, of Lyons, proposed a modification of his ancient double hæmostatic balloon, of which he now makes a uterine dilator fit to induce premature artificial labor and also capable of fulfilling other indications.

Finally, I wish to speak of *laminaria digitata*. This sea-tangle has been used in Paris, but it does not seem to have met with very great success. Drs. Van Wetter and Deneffe (of Gand) obtained good results. I think that the method of preparation of the tubes has more influence upon the dilatation than the substance used. It is best that the tents of *laminaria* should be hollowed so that the action of the uterine mucus may be expended both externally and internally, the swelling then being greater and more rapid. In all cases this substance may be introduced without the speculum, for it resists imbibition of the mucus much longer than the sponge. Hubert has invented a *porte-laminaria* which is very simple and handy; by means of this the tube can be carried into the cervix uteri.

We shall only mention, in addition, certain means which may be em-



ployed for dilatation. They are, so to speak, *extra-scientific*, that is to say, their effects are recognized, but they are never used to induce premature artificial labor; such are baths, bleeding, belladonna, laudanum injections, chloroform, carbonic acid gas locally applied (Scanzoni), etc.

*Third Class: Method in which Excitation is Used.*—Among these we mention: tamponing, vaginal douches, and intra-uterine injections.

*Tamponing*, which has already been described, ought to be reserved for special cases; at least, such is the view generally held in France. But Schœller (of Vienna) tampons to induce premature artificial labor, and Velpeau praised it in 1835. It has the disadvantage of irritating the inferior segment of the womb, and may be deservedly accused of possessing those disadvantages that have been wrongly ascribed to the sponge-tent. Employed in case of hemorrhages it is at once a process of excitation and dilatation, by means of the clot which it holds back within the uterus; hence it never fails to induce contractions.

*Vaginal Douches.*—Introduced into practice in 1848 by Kiwisch, of Wurzburg, but already mentioned in 1825 by Schweighäuser, this method enjoyed a great reputation, and finally dethroned the harmless sponge-tent. It is really curious to listen to the praise Cazeaux, in the sixth edition of his book, still gives to this method. Indeed, for several years it seemed to be a most innocent operation, and in spite of the slowness with which the desired result was obtained, and its great inconvenience, its use was wide-spread, when several cases of sudden death, occurring in the hands of the very best obstetricians, frightened the timid, who went back to the sponge-tent or Tarnier's dilator.

Kiwisch's process consists in directing against the cervix uteri a douche of hot water, which irritates the organ and induces contractions; the jet should be powerful and continuous.

At first the douche was given by a sort of pump, the woman lying crosswise upon the bed, her legs spread and the feet resting upon a couple of chairs. The obstetrician, one hand placed upon the abdomen to prevent the uterus rising under the influence of the douche, had his other hand in the vagina to guide the tube of the instrument toward the cervix uteri, while an assistant pumped in hot water (about 15° C.). The douche lasts a quarter of an hour, and is repeated every three hours; in the interval the woman is to be kept perfectly quiet. Generally eight, sometimes ten, and even twelve douches are required to excite contractions, especially in primiparæ.

Labor then lasts several days, and sometimes, during the night, we lose all the advantage which had been obtained during the day. In the clinics, for a long time, this pump apparatus was used.

In cities the large irrigator of Éguisier, or the continuous irrigation apparatus was substituted for it. This method, less painful, is to-day completely abandoned. We shall refer to this subject later on.

*Intra-uterine Injections.*—This process dates back to 1848, when it was introduced by Cohen, of Hamburg. It seems preferable to the sponge-tent, to *laminaria*, and to all kinds of dilators. Kiwisch himself, after having invented the vaginal douche, saw that it was simpler to introduce the tube into the orifice. In spite of the authority of these learned men in the matter of midwifery, we think this practice has all the dangers of the vaginal douche, if not more; several cases of death have followed its use, and we prefer the sponge-tent or Tarnier's dilator. (Greser, Tardieu, Lazzati.)

Among methods of excitation we may name the introduction of a sound or catheter between the membranes and the internal surface of the uterus. This instrument, left in for eight to ten hours, induces contractions. (Krause.) Separation of the lower segment of the ovum, electricity, ergot, sulphate of quinine, emmenagogues, friction upon the abdomen, upon the breasts, forced walking, etc.—all are methods that have enjoyed a greater or less reputation.

*Mixed Method.*—Since 1860 Pajot has, in his lectures, recommended the use of vaginal douches concurrently with the sponge-tent in certain special cases, and this he calls the "*mixed method*."

I have modified this method so that instead of the sponge-tent I use (after the douche) Tarnier's apparatus, which I have simplified and rendered easy of introduction into the external os, which, in primiparæ, remains closed for a long time, or in those cases where the orifice is agglutinated.

Relying on the fact that the vaginal douche has never caused alarming symptoms before the cervix was dilated, *i.e.*, before the seventh or eighth douche had been given, I administer, in primiparæ, six vaginal douches to soften the cervix uteri; then I introduce the simplified apparatus referred to. This simplification consists in slipping over the extremity of the rubber tube a corrugated bulb, whose cavity is to contain the end of a little curved or straight stylet, for the introduction of the tube into the cervix uteri.

In this way the apparatus is much smaller, it passes into a closer cervix, it does not rupture the membranes, and it cannot wound the uterus. The extremity which hangs down between the woman's legs, instead of having a stopcock (which, by its weight, tends to make the bulb slip down, and also augments the price of the apparatus), is closed by means of a double ligature made with waxed thread, which retains within the ampulla the water which has been injected into it.

In 1864 I read an article to the Académie *à propos* of the changes I made in this instrument, and in the *Obstetrical Gazette* (1870) I claimed priority for its invention. We can make a *résumé* of it in three phrases: ease of application, the greatest harmlessness, and cheapness.

*Choice.*—Among all the methods used to induce labor it may be said

that the methods of dilatation are preferable as a general rule. Yet the choice must vary according to the case, and we cannot keep to one single method. Thus, if the sponge-tent suffices for every case in multiparæ, yet, on the other hand, in primiparæ we ought to prefer the intra-uterine dilator with the simplification that I have proposed, and its application should be preceded by several douches (mixed method). Finally, if we wish to keep solely to methods of excitation, I recommend that of Krause, which consists in the introduction of a sound or catheter between the membranes and the internal surface of the uterus. This, certainly, of all methods of excitation, is the simplest and the least dangerous. The sound must be firmly fixed, for it is often thrown out of the uterus before complete results are attained.

The child must also claim attention from the obstetrician, especially as regards heat and food. The younger the child the more indispensable is great care if we wish success to crown the operation and give it the place which we have endeavored to accord to it in this book.

## CHAPTER II.

### OPERATIONS IN WHICH THERE IS SOME SOLUTION OF CONTINUITY OF THE FŒTAL PARTS.

THIS class of obstetrical operations embraces embryotomy in all its divisions, as well as induced abortion—operations which preserve the maternal tissues to the detriment of the child.

#### ARTICLE I.—EMBRYOTOMY.

Any operation which has for its aim the mutilation of the foetus, to facilitate its extraction wholly or in part, when it is impossible otherwise to extract the mass, is called embryotomy.

*History and Preliminary Remarks.*—Embryotomy is one of the most ancient obstetrical operations, and the works of Hippocrates advocate—in cases of labor where delivery has become impossible—the use of sharp instruments to cut the child within the mother's womb, and to extract its parts by the aid of crochets. Thus embryotomy is an older operation than Cæsarean section practised upon the living female, and when the latter was employed it represented a step forward, because the methods for embryotomy among the ancients were very imperfect.

But within half a century, in which the improvements in the manufacture of surgical instruments gave us the cephalotribe, the saw-forceps, etc., all physicians careful of the real interests of humanity no longer practise the Cæsarean section except when the indications for cephalotripsy no longer exist.

Embryotomy is indicated whenever there is an insurmountable obstacle to spontaneous delivery, when the forceps is powerless or impracticable, and when the limits of the antero-posterior diameter of the pelvis are not less than  $2\frac{3}{4}$  in. This is the smallest measure in which the trunk of the foetus may pass without danger for the mother, in the hands of even the most experienced operators.

Before commencing the study of this question, which is still discussed with so much feeling, we ought to consider two cases: 1, when the child is dead; 2, when it is living. If it is dead, every physician agrees that embryotomy had best be performed whenever the size of the pelvis will



permit this operation. But if the child is alive, then we have divided opinions.

Some, with Professor Pajot, only looking at the scientific side of the question and exclusively in the interest of the mother, propose embryotomy, from the commencement, whenever there is great deformity of the pelvis. Others think that we ought to save the child first, and to do that they propose the Cæsarean section, invoking morals and law on their side. Others, again, moved by a spirit of honorable conciliation, advise expectation until the child dies and *then* they practise embryotomy.

Every man who defends an idea commands the respect of his adversaries so long as he remains within the limits of scientific discussion. In this respect no one deserves more than does Professor Pajot, who has brought to the question nothing but scientific facts and matters of general interest to mankind. He thinks that he can with success perform cephalotripsy in pelves which only measure 27 mm. ( $1\frac{1}{2}$  in.) along the sacropubic diameter; however, there is no instance in practice where success has been attained for the mother when the pelvis measured less than two inches. When less than two inches the life of the woman is almost certainly compromised; and there are great dangers also when we operate between 2 and  $2\frac{3}{4}$  in., as I have already stated, while the Cæsarean operation saves the child and still leaves a chance for the mother, especially with the modifications given to the operation in late years by Porro.

Questions of morality and right are to be judged in a similar sense of liberty of action of the practitioner; this of course depends on the country in which he practises, the instruments at his disposal, the consent of the mother, her health, the condition of the fœtus, the epoch of labor, etc. In all cases a prudent physician should, before undertaking this operation, consult with experienced and older physicians.

As for those who wait for the death of the child before acting, they are supported by the opinion of Hubert (of Louvain), who thinks the child dies a long time before the mother's health is at all compromised in the great majority of cases.

In the last edition of this book I stated: "The more I observe the more I believe that it is possible to perfect the methods and the subsequent treatment of the Cæsarean operation, which will then become less disastrous." I was right, and with the utero-ovarian amputation according to Porro's method, and the recent improvements of Muller (of Berne), a great number of physicians no longer hesitate to adopt this method when the pelvis is extremely deformed, especially when far from the city, where improved instruments for embryotomy cannot be had, and where the air and surroundings are so favorable to the woman's recovery.

In the presence of the ever-increasing success of ovariectomy, we cannot help believing that it is an example which obstetricians should follow, an

amelioration which we are yet to realize. We shall recur to this subject again, when discussing operations of the third class.

I must ask pardon of my former professor and preceptor, Pajot, if I have not adopted his practice and his instruction, but I think that a slight divergence of opinion on a subject so much discussed will prove to him the confidence that the nobility of his character has inspired in me, and my zeal in the search after truth.

*Classification.*—Embryotomy can be divided into two great classes, according as the *cephalic* extremity of the foetus or the *trunk* is operated upon.

In the former case, the operation will take the name of craniotomy, cephalotripsy, cephalotomy, etc., according to the instrument chosen. In the second case, we perform either embryotomy properly so called, or the operator makes a section of the trunk or neck, amputates a member, or performs evisceration.

§ 1. CRANIOTOMY, OR PERFORATION OF THE SKULL.—The instruments of Hippocrates were only meant to cut the foetal head, so that the cerebral matter could flow out and the head might engage in a narrow pelvis.

The works of the Arabs contain numerous models of perforators, and these authors took their ideas from those works on medicine saved when the second Alexandrian Library was destroyed, in the year 640.

*Smellie's scissors*, dating from the second half of the eighteenth century, were employed even until our day, and since several practitioners still use them we shall devote a few words to their description. This is a locked instrument, whose cutting surfaces are external, and which therefore demand the protection of a shield when they are introduced into the maternal soft parts. This shield complicates the manipulation. Once introduced into the cranium of the foetus, these scissors are opened to an extent determined by a screw which is fixed in the rings; and performing the operation with both hands, the cerebral matter will be destroyed over a large extent of surface. The instrument is removed with the same precautions that have been taken in its introduction.

Struck with the disadvantages of Smellie's scissors, Dr. Blot made a perforator composed of two blades, one covering the other, so that when the instrument is closed the blunt edge of one blade extends one-twenty-fifth of an inch over the cutting blade, and *vice versa*. There is no need of a sheath or protecting envelope for this instrument. It is worked with one hand, and in both these respects is of far greater use than Smellie's scissors. This is the instrument that we adopt. A spring, C, closes the blades; a lever, D, determines the extent to which they shall be opened. (See Fig. 92.)

Still, change was yet necessary. Simpson made an improvement by giving to his perforator, stronger than Blot's, a curve upon the flat surface,

destined for adaptation to the pelvic axis. But Simpson's model cuts by its external edges, and since it has no sheath, its introduction is dangerous for the mother and also for the obstetrician's fingers.

Dugès also invented a *terebellum*, a sort of conical cutting screw which is no longer used by any one.

The sharp point contained in the handle of the ordinary forceps may, if necessary, be used for a perforator, but it is always a poor instrument. In France, Dr. Guyon, in Germany, Prof. Kilian (of Bonn), both use the modified trepan to practise craniotomy. Guyon, after opening the cranium, trepans the sphenoid, and in this respect his instrument acts as a cephalotribe, of which we shall speak further on. Trepanning has the advantage of making a regular wound, without sharp edges, through which cerebral matter readily flows; but the instrument is difficult to apply.

*Manual Operation.*—The woman should lie crosswise upon the bed, just as when we apply the forceps. Then a vessel is placed between the legs, and over these a sheet, so that the cerebral matter may fall into the former, and the latter prevent those around from seeing what is occurring; then fix the head of the fœtus at the superior strait and thrust the left hand, except the thumb, into the vagina. When the head of the fœtus is felt, no matter whether the dilatation be complete or not, slide the perforator flatwise along the palm of the hand just within the vagina, and apply its point, covered by a wax-ball, against the cranial bones and, as near as possible, perpendicular to their surface, feeling neither for sutures nor fontanelles; then push down the handle of the instrument toward the perineum, so as to avoid any slipping that may wound the mother or the operator; then by strong pressure combined with slight rotary movements perforate the skull. As soon as the obstetrician feels that the resistance is overcome, and when a mixture of black blood and cerebral matter flows out of the vagina, cease this kind of effort and press with one hand upon the lever, to separate the blades of the instrument and give them movements in different directions to crush the brain matter, which then flows out mingled with blood. After this close the perforator and remove it.

As a general rule, this operation is successful, and there is no need to throw any injections into the cranial cavity. In cases where uterine contractions do not bring about engagement, a simple application of the forceps will terminate labor. However, with great deformity, when the extent of the base of the skull is greater than the antero-posterior diameter



FIG. 92.—Blot's Perforator. A, Blade of the instrument; B, the lock.

of the pelvis, craniotomy precedes and facilitates cephalotripsy, of which we shall soon speak.

In face presentations the same rules are to be followed, though here the operation is more difficult than in vertex presentations. When possible, we must plunge the instrument either into the orbit or through the forehead, and if the lower part of the face is alone accessible, penetrate the mouth so as to traverse the palatine vault behind the nasal fossæ. Similarly, in breech presentations, if the chin remains flexed after the trunk is delivered we should prefer perforation of the cranium through the palatine vault to piercing the occiput, the latter bone being extremely hard and slippery.

The ancients, after perforation, often employed a sharp crochet, which had the advantage of not adding to the diameters of the foetal head, since its fulcrum was in the cranial vault itself; but the dangers of the crochet on account of its slipping have led to its being abandoned for the cephalotribe, which replaces all instruments for nearly all similar purposes.

§ 2.—CEPHALOTRIPSY.—Cephalotripsy (from κεφαλή, *head*, and τρίψω, *I crush*) is an operation which consists in crushing the foetal head to facilitate its extraction whenever the base of the foetal cranium cannot pass the superior strait.

The first idea of cephalotripsy dates back to the time of Hippocrates; but neither the instrument nor the more modern inventions of Coutouly, Assalini, or Lauverjat had power enough to destroy the base of the cranium, which is the object we have in view whenever we propose cephalotripsy.

An instrument strong enough to do this was desired, and in 1827 the younger Baudelocque invented the cephalotribe.

In 1829 Baudelocque published his first successful case; this was followed by several others, but it also had its disadvantages. The shanks of the cephalotribe were straight, and consequently hard to apply in the superior strait. The lever which was to approximate the blades was too strong, and placed perpendicularly to these blades, it inconvenienced one of the assistants during the operation. Finally, this cephalotribe permitted slipping of the foetal head, because the blades did not exactly embrace the head, and traction had to be made in an inappropriate direction.

Cazeaux gave to the blades of the primitive cephalotribe a curve along their edges, similar to that of the forceps. He also modified the lock so that slipping of the head became difficult. Blot simplified the lever, while he left the blades still perpendicular.

Chailly replaced it by a little winch placed at the end of the left shank, upon which played a little leather belt, a mechanism approximating the shanks.

Depaul substituted for Chailly's little leather belt a linked chain which also works upon a winch; he terminated the two blades by two hooks bending inward, and he disjoined the cephalotribe like the forceps.



Pajot reduced the thickness of the blades of the cephalotribe—which he applies in extreme deformity of the pelvis—to  $1\frac{1}{2}$  in. He considers this limit as that beneath which the cephalotribe cannot be introduced. But the greatest step that this author has taken *à propos* of cephalotripsy, is the method he has advocated, and which he has for a long time successfully practised, called “*repeated cephalotripsy without traction.*”

In 1873 Dr. Bailly proposed a new cephalotribe, which, fenestrated like the forceps, has over all other cephalotribes the great advantage of being at once an instrument of prehension and traction, and at the same time of compression.

But the opening of the fenestra reduces the field of application of Bailly's cephalotribe to deformed pelves measuring three inches, *i.e.*, only in those cases where deformities are very slight.

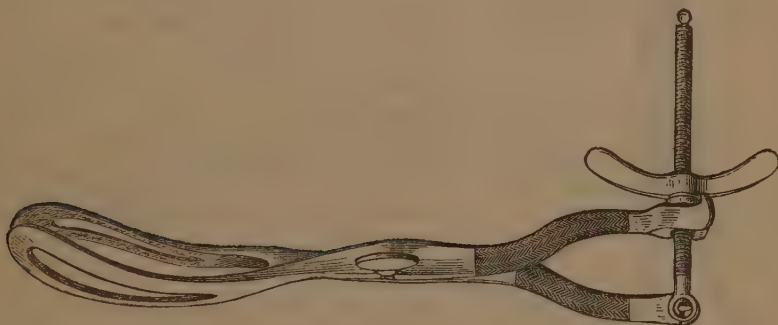


FIG. 93.—Fenestrated Cephalotribe of Dr. Bailly.

For a practitioner who desires to purchase a cephalotribe, the choice lies between Cazeaux's modified by Blot, Depaul's, Bailly's, and Tarnier's. We prefer the first named, because it is simpler, suffices in all cases, and only costs \$8. The second, however, is more perfect, but it costs from \$16 to \$18. Besides, if we find an advantage in the hooks which lie at the extremity of the blades to fix the head of the foetus and prevent its slipping, we also find that they are inconvenient in those cases where we wish to practise, with the same instrument, Professor Pajot's method, which, from day to day, is becoming more and more popular. As for Bailly's fenestrated cephalotribe, as it only suffices when there are very slight deformities, we do not recommend it to the general practitioner, unless he wishes to have in his possession every instrument that is made.

Finally, upon the same idea that gave fenestrated blades to the cephalotribe, a perineal curve, like that of Tarnier's forceps, has been given to the instrument. This cephalotribe with the perineal curve being applied at the superior strait, has all the advantages of a forceps with a perineal curve and none of its disadvantages. We give a representation of it on page 337. As we have already stated, Tarnier's forceps (newest model), when

carefully handled, may, after craniotomy is performed, replace the cephalotribe within the pelvic cavity better than the ordinary forceps could do. But the price of this instrument will for a long time be an obstacle to its popular use.

[Lusk's instrument is useful, and destined for general employment in this country.—Ed.]

*Description of the Classical Cephalotribe.*—Like the forceps, the cephalotribe has a left or pin blade and a right or mortise blade. The lock is a flat entablature facilitating approximation of the blades, without demanding a marked curve upon their surfaces. The pin or pivot is very strong and has a thumb-screw; the mortise is open (lateral mortise) upon the side of the right blade.

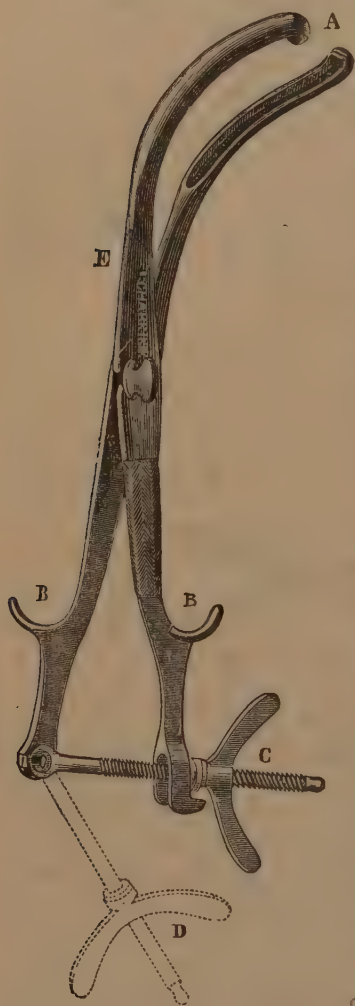
The blades, non-fenestrated, except in Bailly's and Tarnier's cephalotribes, are concave within and furnished with corrugations so that they may solidly grip the foetal scalp. Their curve is very marked at the superior border, and their extremity is blunt and rounded. The thickness of the blades varies according to the manufacturer, but it generally permits the introduction of the instrument into very narrow pelves. The blades, flat and smooth externally, give a good grip to the obstetrician, and a slight projection gives a firm hold to the hand. Finally, a movable screw, which can be fixed at will upon the extremity of the left blade, enters a bifurcation in the right blade.

A flying screw allows us to approximate the blades at will.

FIG. 94.—Cephalotribe. A, End of the blades; B, point of traction (this is not present in all cephalotribes); C, the flying screw of Blot, to approximate the shanks; D, first direction of the screw; E, the flat shanks.

The latter occupies little space and can readily be removed when we wish to unlock the cephalotribe.

There are many other models; those of the Germans differ especially from ours by their system of compression; but they are all large instruments, difficult and dangerous to use whenever the pelvic diameters are reduced to  $2\frac{3}{4}$  in.



*Rules for Application.*—There are two methods of applying the cephalotribe, the simple or ordinary method, and the “*repeated application without traction*,” the method of Professor Pajot. In both the blades are always directly applied to the sides of the pelvis.

*Simple Application.*—This has the greatest analogy to application of the forceps; thus:

*First Stage: Introduction and Placing of the Blades.*—The woman is to be in the same position as when the forceps are applied; the assistant being properly stationed, and all other precautions being taken, the right hand except the thumb is to be pushed deeply into the vagina and introduced into the cervix uteri. The left hand, holding the left blade flatwise, inserts it along the sides of the foetal head, which has previously been fixed by an assistant holding it through the abdominal walls of the mother; the end of the handle is then to be pushed far down upon the perineum. The same manœuvre places and fixes the right blade.



FIG. 95.—Fenestrated Cephalotribes having a Perineal Curve (Tarnier's model). E, Small fenestra; F, large fenestra; A, handle suitable for either model; E, the spindle; D, the transverse wooden handle.

*Second Stage: Locking.*—The shanks having been thrust deeply in so as to seize as much of the foetal head as possible, slowly approximate them; then lock them by means of the pin or pivot, turning it as far as we can.

*Third Stage.*—After having found out whether our application is regular or not, fix the winch at the extremity of the right blade and screw it down toward the right. Then, holding the instrument in the left hand, lower it upon the perineum and with the right hand turn the flying screw to approximate the two shanks. There is no doubt but what, if the head has been firmly gripped, it will be crushed by this lateral compression. But since the narrowest diameter of the pelvis is generally the sacro-pubic

and the crushing follows the transverse diameter, the antero-posterior diameter of the head will be increased, and to facilitate extraction and before commencing to pull, we must give the cephalotribe a rotary motion either toward the right or left, so as to place the *narrowed* portion of the foetal head in relation with the *narrowest* diameter of the pelvis.

Then commence traction, which must be made very slowly, touch being frequently practised to find out if any sharp edges are wounding the mother, and if the instrument has still a firm grip. Redouble your precautions when the flattened head escapes from the vulva, and take away the instrument so as to deliver the trunk with the hands.



FIG. 96.—Cephalotripsy. Beginning of the third stage.

*Complications and Difficulties.*—With considerable deformity, placing of the blades is sometimes a very difficult matter, because of elevation of the head and irregularity of the pelvic canal. Narrowness of the blades is an obstacle to the grip; and if the head is not seized by two points that are diametrically opposite, it will slip and escape from the instrument. Then we must try a second application. The operation, such as we have just described, may be the first employed; but to-day we generally perforate the cranium before attempting it, so as to obtain a more complete reduction of the head and prevent sudden rupture of the bones, which, piercing the scalp, may tear the maternal organs during a contraction.

Those who first performed the operation were not so successful, because they neglected the movement of rotation before commencing traction. If, however, the instrument be introduced following the left oblique diameter of the pelvis, the head will usually be seized at its biparietal diameter, and will enlarge in the opposite direction, and a very slight movement backward will suffice to engage it. But this oblique grip of the head is difficult when there is considerable deformity of the pelvis.

Joulin, after making many experiments in the *École Pratique*, states



that the increase in the diameters of the fœtal head occurs vertically oftener than laterally. This increase in this direction ought to be favored by previous perforation of the cranial vault. Wasseige does not regard with favor the application of the cephalotribe in the pelvic cavity, because, he says, expansion occurring in the antero-posterior direction is very often followed by wounds of the maternal parts.

The greatest complication of cephalotripsy is no doubt slipping of the instrument at the moment when we first begin traction. For, as Jacquemier says, if the cephalotribe is a good instrument of reduction, it is a very poor instrument of traction. Hence Chailly advises us to take away the cephalotribe after crushing the head, and to end labor by the forceps; and Dr. Bertin proposed, quite recently, to follow cephalotripsy by podalic version (*Gazette Obst.*, 1873; obs. Lizé, du Mans). It also happens that the obstetrician, after having repeatedly attempted to reapply the instrument which has slipped off, is obliged to abandon labor to nature, which, when there are any uterine contractions, can itself expel the fœtus. Similar cases gave to Professor Pajot the idea of a method of repeated cephalotripsy without traction.

*Repeated Application without Traction.*—In a little pamphlet published by Pajot in 1863, this obstetrician declared “that in deformities where the pelvis measured between  $3\frac{3}{4}$  and 4 in., simple cephalotripsy usually presented all the characteristics of an excellent obstetrical operation. But,” he adds, “where deformities give measurements under  $2\frac{3}{4}$  in., cephalotripsy is an excessively dangerous operation, so that we may say, not without reason, that it compromises the life of the woman as much as the Cæsarean section, and that, too, without the compensation which the latter in all probability offers, preservation of the fœtal life.” “With simple cephalotripsy, indeed,” continues Pajot, “the impossibility of reaching the base of the cranium, the great traction that is necessary and which is often useless, the pressure, the attrition, the lacerations, and the immediate or remote death which often results, proves to us how close is the connection between the danger of such cephalotripsy and the Cæsarean section.”

“But if all these considerations be true with regard to the ancient method, they are no longer so concerning the method of repeated cephalotripsy without traction.” To practise the latter, the woman is first placed in that position always given for any obstetrical operation, and the cranium is perforated before completing dilatation, which latter operation is facilitated by such perforation. Then, “when the orifice is sufficiently dilated to allow the passage of the instrument, proceed to operate.”

*First and Second Stages.*—Identical with simple cephalotripsy.

*Third Stage.*—After having approximated the shanks of the instrument, and crushed the base of the cranium as extensively as possible, unlock the instrument and bring it out, following the axis of the pelvis, and depart after putting the woman in bed, prescribing *bouillon* or some bland broth.

Two hours afterward make another application, followed by removal of the instrument; give two hours' rest, and perform the operation again. The obstetrician, being guided by the condition of the pulse and the general appearance of the mother, sometimes performs the second, and even the third crushing at the same *séance*. When, in 1863, Pajot operated in this way, each crushing was followed by a movement of rotation by which the diameter of the head, which had been flattened, was brought opposite the antero-posterior diameter of the pelvis, which is usually the one most narrowed.

Since then, experience has proved to him that this rotation, sometimes dangerous, is always useless.

By virtue of the great law of accommodation which presides over the exit of the foetus, the womb finally moulds itself to the new form given to the head by the crushing, and impresses on it a movement of rotation, without the aid of any instrumentation.

After a certain number of successive crushings, the head is reduced to a soft pulp, which permits engagement even in the narrowest pelvis; sharp edges of bone, if they exist, are but very small, and since labor is finally abandoned to nature, these spiculæ cannot harm the mother very much.

It may be useful, in many cases, to put the woman in a bath between the crushings; and often, when contractions are exhausted, they should be awakened by a dose of ergot to facilitate expulsion of the foetus. The trunk may be an obstacle to the termination of labor after reduction of the head, and the obstetrician will then be obliged to make an application of the cephalotribe upon the trunk and crush the thorax.

*Choice.*—Simple cephalotripsy is always a grave operation, because of the size of the instrument and the circumstances in which we practise the operation. Its dangers are due to the sharp pieces of bone which may tear the maternal parts, to inevitable attrition, and to the traction necessary to cause the mutilated foetus to pass through a deformed pelvic cavity. This operation becomes even impracticable whenever the pelvis measures less than 2½ in. At this limit, indeed, there are but two methods of delivering the woman—the Cæsarean section or repeated cephalotripsy.

The latter method is almost the only one now adopted in our great cities, where the Cæsarean section has not proved very successful. But to be assured of the success of this method, we must commence early and obtain the consent of the family, for the repeated introduction of the instrument generally frightens them exceedingly. Happily three or four *séances* usually suffice to terminate labor.

When the head has thus been crushed a number of times, the trunk alone offers any resistance; but one or two crushings will, as a general rule, overcome such difficulties, and the operation may be terminated in between six and eighteen hours, twenty-four hours in the worst cases. The

prognosis rests entirely on the time when we begin to operate ; the outlook is worse the longer the operation has been undertaken before commencement of labor, and the more numerous have been previous attempts at extraction before we have undertaken it.

§ 3. FOREIGN INSTRUMENTS. 1. *The Saw-forceps*.—Prof. Van Huevel, of the Brussels University, invented the saw-forceps. To-day more than

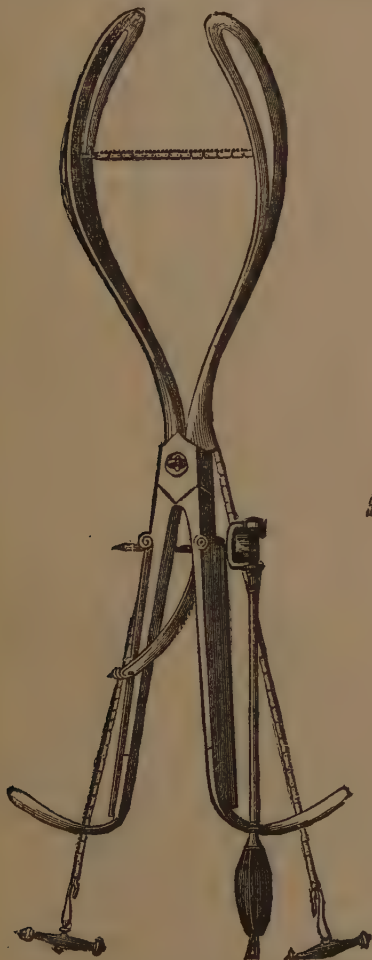


FIG. 97.—The Saw-forceps of Van Huevel (modified by E. Verrier).

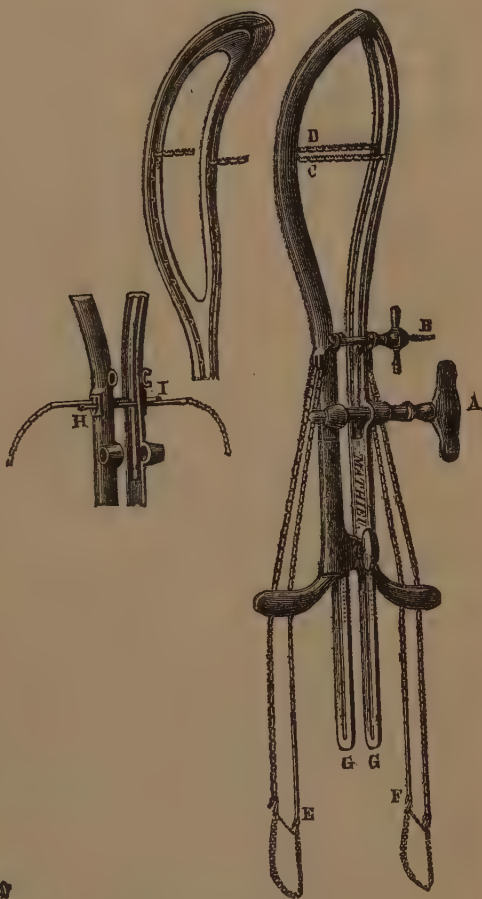


FIG. 98.—Tarnier's Saw-forceps.

one hundred and fifty cephalotomies have been performed with this instrument, and for the mother the success has been far greater than with the cephalotribe ; hence, in spite of opposition, the saw-forceps has to-day become a classical instrument, thanks to the improvements which have been made in it. I myself have contributed to this result, and I congratulate

myself upon it, because every friend of humanity should do all in his power to make popular any useful instrument; and my inaugural thesis (1863), my parallel between the cephalotribe and the saw-forceps (1866), the changes that I have made in the primitive invention of Van Huevel, as well as my private and public instruction, stand as attestations of what I state. Tarnier's book, Joulin's book, Bachos' thesis (Paris, 1872), etc., also support my assertions. In the last-named thesis, which gives a *résumé*

of the statistics of cephalotomy published up to that time, we find, out of 94 cases, 75 successful; in other words, about 80 per cent. (*Gaz. Obst.*, No. 22, 1873.)

Such as it is, Van Huevel's instrument removes, and usually without violence, a sufficiently large piece of the skull to subsequently permit the extraction or even spontaneous exit of the foetus through the narrowed pelvic canal. When the head is flexed (and this is usually the case) the base of the cranium is sawn through, cerebral matter flows out, and the detached segment is brought into the pelvic cavity and delivered by means of the small forceps.



FIG. 99.

But in intermediate positions, when the head is between flexion and extension, it may happen that a slice of the cranium is cut off from the head, and this may hang as by a pedicle from the soft parts, being usually attached to the muscular portion of the back and neck; to extract this loosened segment, we must perform torsion upon its pedicle with a small forceps. This is a delicate, often a very difficult operation.

After having experienced these difficulties (Dr. Bachos), Tarnier, who thought that it was best not to have recourse to version after the operation (Bertini's process), invented himself a saw-forceps with a double chain, which, converging, cut off a complete segment of the cranium as shown in Fig. 99. Provided always that the application be regular, all difficulties are now done away with, but the instrument is very complicated; while the improvement that we have made in the saw-forceps of Van Huevel, makes the latter's use simple and certain, and no more assistants are required than in the case of an ordinary application of the forceps. Besides, we think that both the saw-forceps and the cephalotribe have each their proper indications. To give a *résumé*, we may say: the saw-forceps with one chain is best in vertex presentations with a flexed head, whatever be the position at the superior strait, when the measurement is  $2\frac{3}{4}$  in.

In presentations of the face, in inclined vertex presentations, or with the frontal variety, when the measurement is  $2\frac{1}{2}$  in., the cephalotribe, with or



without perineal curve, but with fenestrated blades, is to be used. With measurements from  $2\frac{2}{5}$  to  $2\frac{4}{5}$  in. use the straight cephalotribe without fenestra, following Pajot's method.

In all cases when the measurement is less than 2 or even  $2\frac{2}{5}$  in., according to circumstances, I prefer the utero-ovarian amputation according to Porro's method.



FIG. 100.—The Cranioclast.



FIG. 101.—Hubert's Perforator.

Matthew has applied to the saw-forceps, either with simple or with double chains, a system of parallel blades and flexible conductors. His compression screw is perpendicular to the conductors. We purpose to try this model whenever occasion offers.

2. *The Cranioclast*.—This instrument (Fig. 100) was invented by Simpson. It has two shanks: the pivot-blade being solid and corrugated inter-

nally. It is thrust into the skull after previous perforation. The mortise-blade is fenestrated, and its indentations correspond to the ridges of the other blade. The mortise-blade is applied on the outside of the foetal head, and thus whatever it seizes it readily crushes. Simpson's cranioclast is inferior to the cephalotribe, as it is difficult for the former to reach and destroy at once the base of the cranium; hence every part of the base must be successively crushed before the head becomes reducible, and this is a long and tedious operation. The sole advantage of the cranioclast is that it is a good instrument for traction, and may therefore be employed to this end. In Dr. Tarnier's hands it has been useful in this respect after a cephalotripsy when the cephalotribe proved powerless to extract the head. Dr. Porak in the Hospital Saint Louis had a similar case.

3. *The Perforator*.—The late Professor Hubert, Sr. (of Belgium), invented an instrument called the *perforator* for crushing the base of the foetal skull. It is very simple. It has two shanks: one, the straight, represents almost exactly Dugès' *terebellum*, and is for perforating the skull. The other, curved and serrated at its extremity, receives the sharp point of the former, acts as a fulcrum for it, and also limits its sphere of action. It presents, internally, a groove running to its base, and held by two collars or bolts. The operator, after perforating the skull with the *terebellum*, fixes the curved shank at the side of the foetal face, and he feels his way with the point of the other blade till he meets the sphenoid, found very readily, as a rule, says Hubert. When the instrument is fixed upon the sphenoid carry the handle of the *terebellum* across to the groove and fix it therein by means of the collars. Thus fixed the point of the instrument always corresponds to the fenestrated end of the curved shank. Then perforate and crush the base of the cranium. This instrument is both a good tractor and a good crusher. Unfortunately, the straight shank renders its application at the superior strait very difficult. I think it possible to choose some other point than the sphenoid; according to the degree of flexion of the head. True, in this case the aim of the instrument is perverted, but there is no more danger incurred by the mother by such a proceeding.

§ 4. EMBRYOTOMY, PROPERLY SO-CALLED. *Section of Trunk and Neck*.—When in transverse presentations the membranes have ruptured and the waters have long since flowed away; when there exists procidentia of an arm with close contraction of the uterus, and when version is impossible or very dangerous for the mother, then we must divide the trunk or neck.

The latter is Celsius' *decapitation*. As far as possible it should be reserved for breech presentations, or when in version, the trunk being out, the head is still retained at the superior strait. Except in these cases the trunk should be cut in preference to the neck, for the head may be left within the uterus in the latter case, and it is difficult to extract it by means of instruments on account of its great mobility. True, nature has sometimes expelled it herself, but we must not count on this, for the womb

is exhausted, and a prolonged stay of a mutilated head in the maternal organs may induce grave symptoms.

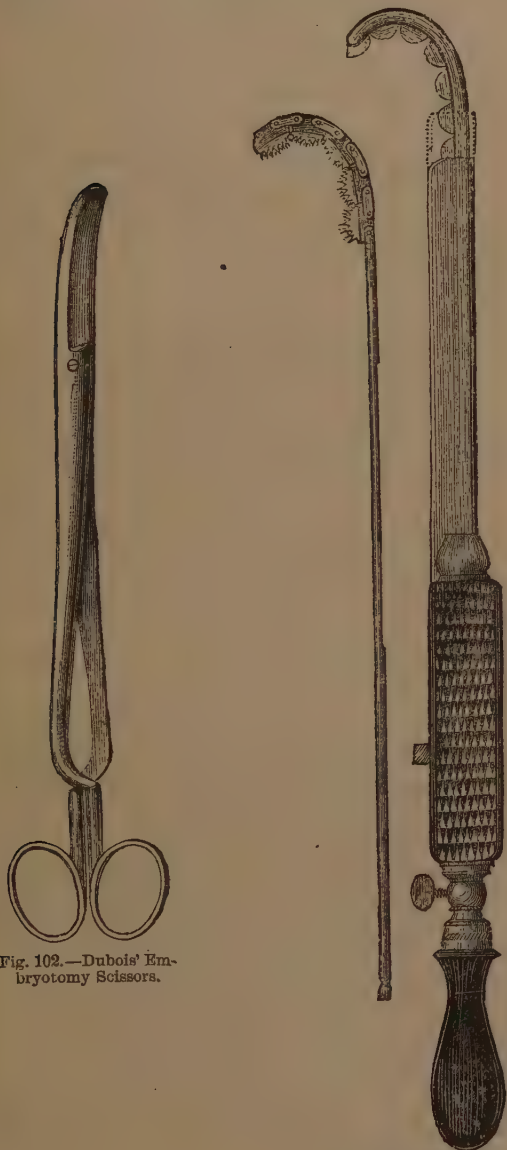


Fig. 102.—Dubois' Embryotomy Scissors.

Fig. 103.—Jacquemier's Embryotomy Crochet.

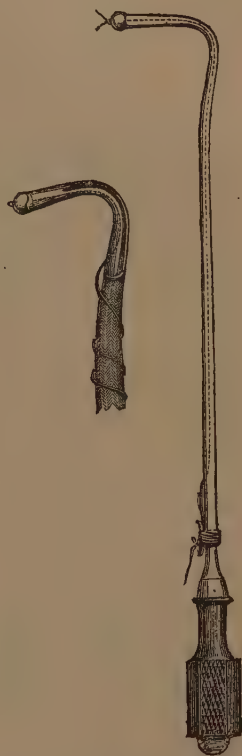


Fig. 104.—Pajot's String Crochet.

Decapitation is performed with the same instruments as those used upon the trunk. When the trunk is out Dubois' scissors is the best instrument therefor. This long and strong scissors is curved on its flat sur-

face, has little blades and crossed handles. P. Dubois also uses them in transverse presentations. Here he introduces the left hand to direct the instrument and protect the soft parts of the mother. With the right hand he carries the instrument, the point outward, up to the foetal axillary fold, and then makes little cuts on the trunk.

The blades are generally strong enough to cut the spinal column, and once the operation is over the section of the trunk has the shape of a sling, the cut extending from the lower portion of the lower shoulder to the upper part of the upper shoulder. This operation, especially applicable when one arm is out, allows us to deliver more easily the two truncated portions of the foetal body. If procidentia of the arm does not occur, it is best to operate on the neck of the foetus.

To render this a less dangerous operation for the mother, Ramsbotham and Jacquemier have each invented a crochet which is inserted above the upper shoulder and cuts the foetus from above downward, keeping the section as far as possible running in the same direction. Jacquemier's instrument is composed of a *blunt hook*, having a groove or slot-hole, in which fits a cutting and jointed blade that projects into the crochet's concavity.

Giving a to-and-fro motion to this blade, the operator cuts the soft parts; then substituting a jointed saw for the cutting blade the hard parts are cut, the operation being ended by introducing again the cutting blade to divide resistant tissues.

Professor Pajot proposes a method fulfilling more simply and exactly all the conditions desired in the use of Jacquemier's instrument.

Pajot places a sort of thimble at one end of the forceps' crochet so that it may receive a lead ball which is to be retained in the cup by means of a string running along the shank of the forceps (Fig. 104). This shank, armed with the ball, is introduced above the upper shoulder. Then the thread is dropped and the ball from its own weight tumbles into the vagina, falling toward the posterior portion of the pelvis. On removing the ball the operator ties a whip-cord to the leading-string. This cord surrounds the foetal trunk, and, the soft parts being protected by a speculum, a rapid sawing motion of the whip-cord cuts the foetal trunk in a very few seconds.

Formerly in procidentia of an arm the member was cut off. R. Lee (in England) states that disarticulation of the shoulder allows passage of the hand.

This operation, generally regarded unfavorably, should not be absolutely rejected, however, in cases where uterine contraction and procidentia of an arm coincide with a deformity of the pelvis. To-day auscultation will prevent the serious error of disarticulating the arm of a living child.

*Evisceration.*—This dangerous operation, so hateful to the obstetrician, consists in opening the foetal trunk either with Dubois' scissors, which cut away the clavicle, or by opening the thorax in the axillary fold so as to re-



move the lungs, then removing with the hand or a strong forceps the diaphragm, etc. (Posta.) We only perform evisceration in those cases where the fœtus is of size disproportionate to the pelvis, because of exaggerated volume of the viscera, or when there are collections of fluid within the splanchnic cavities. (Depaul.)

Posta terminates labor by version whenever the size of the trunk is sufficiently diminished to allow of this operation.

The sharp crochet or the simple blunt hook (Pamart) thrust through the abdomen to the thoracic wall will in some cases facilitate foetal evolution.

## ART. II.—INDUCED ABORTION.

The indications for this have already been given in the chapter on deformed pelvis and uncontrollable vomiting. The operation has many opponents. In France the masters of the obstetric art favor induced abortion whenever the deformity of the pelvis leaves no chance of success to the woman who has reached the period of foetal viability—should we at that time wish to bring on artificial premature labor for the sake of saving the child.

The operation is performed like that for premature labor (q. v.); the only difference is regarding the period of gestation, abortion occurring before the sixth month, and in many cases long before that. Of all the methods puncture is the best, since the life of the fœtus is then sacrificed. Detachment of the lower segment of the ovum has been proposed by Professor Pajot.

[We should favor cervical dilatation and uterine irritation by means of tupelo-tents. One or more thorough applications are almost certainly and pretty promptly productive of abortion. If the ovum is simply punctured by the uterine sound foetal vitality is usually destroyed, decomposition commences, and as some days may elapse before expulsion of uterine contents takes place, we have putrid, offensive discharges which are liable to produce infection.—Ed.]

To provide against any subsequent trouble the obstetrician who decides to perform this operation should consult with his peers and should operate in their presence, first having given notice to the civil authorities that at such a day and at such an hour he would perform in such a house the scientific abortion which conscience told him would be a necessity. The after-treatment of abortion is the same as for premature labor.

## CHAPTER III.

### OPERATIONS IN WHICH THERE IS SOME SOLUTION OF CONTINUITY OF THE MATERNAL PARTS.

In this third and last class we shall describe symphysotomy (or symphyseotomy), vaginal hysterotomy, forced delivery, gastrotomy, gastro-hysterotomy, or the Cæsarean section, and Porro's utero-ovarian amputation.

§ 1. SYMPHYSEOTOMY OR SYMPHYSOTOMY.—This operation was first advocated in 1768 by a French medical student—Sigault. But to-day it possesses a mere historical interest. It consists in cutting the pubis at the inter-pubic cartilage.

When it was introduced into practice there were violent discussions between its partisans and those of the Cæsarean section. The latter are discussing the matter yet.

Since then the sphere of usefulness of the forceps has widened, the cephalotribe has been invented, premature labor has become popular, and symphyseotomy has fallen into oblivion.

Besides, this operation evoked great dangers to the mother, while it only increased the sacro-pubic diameter by two-fifths to four-fifths of an inch.

Oftentimes the labor had to be terminated by forceps, and it has even been necessary to subsequently perform Cæsarean section.

The diameter which enlarges most in this operation is the transverse, a diameter that rarely proves an obstacle to the passage of the foetus.

Moreover its statistics are not encouraging. Churchill gives 16 deaths out of 49 women operated on ( $32\frac{6}{10}$  per cent.); Clauzure, 72 out of 157 (46 per cent.). The mortality rate of the children in this operation varies from 60 to 65 per cent. Many of the women who recovered were left with incurable infirmities; they were either lame or had fistulæ, prolapsus uteri, necrosis of the pelvic bones, or chronic suppuration.

Subcutaneous incision should be practised if ever there is a revival of symphysotomy (Imbert), and then the operation may have better results.

§ 2. VAGINAL HYSTEROTOMY AND FORCED DELIVERY.—Vaginal hysterotomy, pompously called the *vaginal Cæsarean operation*, simply consists in multiple incisions made around the vaginal portion of the *cervix uteri*, when the opening in the latter is wholly or partially obliterated, when it is

hard and scirrhus, or when it offers an insuperable obstacle to spontaneous labor.

We have often referred to such incisions on previous pages. Nature seems to indicate them,—witness the lacerations of the cervix in primiparæ.

In cases of complete obliteration of the cervix we perform vaginal hysterotomy by means of a bistoury and a speculum upon the lower segment of the womb. This is infinitely less dangerous than actual hysterotomy.

*Forced delivery* consists in rapid dilatation of the cervix by means of the fingers (Puzos' method) after the cervix has commenced to dilate during severe hemorrhages whose cause is an abnormal implantation of the placenta. Forced delivery, brought into vogue before Puzos' time by Guillemeau and Louise Bourgeois, may now be employed whenever the child's life can be saved by rapid extraction, and in cases of rupture of the uterus, and even after death of the mother. In the last-named cases vaginal hysterotomy may be combined with the operation, and large cuts may be made to give passage to the hand or to instruments for extraction of the child.

§ 3. GASTRO-HYSTEROTOMY (THE CÆSAREAN SECTION) AND GASTROTOMY.—Gastro-hysterotomy and gastrotomy are grave operations of this third class. They consist in incising the abdominal walls (in gastrotomy) and the uterine walls in addition (in the Cæsarean section) in order to deliver the foetus.

*Division*.—These operations are performed upon the dead and the living mother.

*Post-mortem Cæsarean Operation*.—Performed since the earliest times, this operation, although now unimportant, demands the first consideration. A law of Numa forbade burial of a dead pregnant woman before opening her abdomen and taking away the child. Thanks to this law the Roman Republic gained such men as Scipio Africanus, Manlius, and Agrippa. Hence moral as well as civil law induces a physician to perform the operation—when sure the woman is dead—whenever he is called to a pregnant woman who has just expired.

In January, 1874, Laforgue (of Toulouse) wrote to L'Académie de Médecine stating that among the young soldiers (of the class of 1873) was a robust young fellow whom he extracted from his dead mother's womb twenty years before, in 1853.

No commentary is needed on this.

An interesting question which arises is: How often has the foetus survived the mother? We must consider the epoch of foetal viability, so as not to increase the sorrow of a family by a useless operation. Recognizing a pregnancy of at least 210 days, we must find out whether the foetus is alive or dead. Auscultation aids here, but we must not rely on this alone, for we may obtain negative signs only, in spite of the fact that the child lives. (*Vide* "Signs of Death or of Life of the Foetus.")

When the mother dies of some disease the child often succumbs first, death is often preceded by active, tumultuous movements, and irregular and rapid heart-beats. When the mother dies from accidents the child lives, as a rule, but only for a very short time, a fact we learn from physiology. Experience proves to us that the life of children extracted ten, twenty, or even thirty minutes after death of the mother may be preserved. As for those children born alive a day or more after death of the mother, we can only suggest that maternal lethargy has been mistaken for actual death. Such cases are doubtful at least.

However this may be, since apparent death may occur in a pregnant woman and the indications for operation be urgent, we must in operating take all those precautions that we shall name (*vide infra*) in case of section upon the living subject.

In a discussion at the Académie in 1861 several members gave valuable advice. (Read Depaul's discussion at that time, and also the *mémoire* by Villeneuve, of Marseilles.) The former names six months as the period of viability of the fœtus, and one hour as the longest time the child can live within the womb after death of the mother. The latter gives several cases where children lived two, three, and even four and a half hours after death of the mother. He thinks listening for the heart-sounds before making an abdominal section is losing precious time; but he admits that when the physician at first hears the fœtal heart, and soon after these sounds cease, an operation had best not be performed.

Where the woman has died during labor we may choose between the Cæsarean section and post-mortem forced delivery. In the latter instance, if the cervix is not dilated sufficiently to allow rapid extraction of the fœtus, despite the relaxation of the muscular fibres, which are less resistant in the *cadaver*, and the possibility of incising the uterine neck, we have feeble chance of saving the child, because of the time lost in manipulation and the violence offered it by the forceps or version. Now gastro-hysterotomy is easy, it is quickly performed, and it does not in the least injure the fœtus, whose life we seek to save by the operation. (Perrin.)

Where, after rupture of the womb, the product of conception has passed wholly into the abdominal cavity, and the mother is dead—as usually occurs—all abdominal section over the point where the mass is located will constitute a “*post-mortem gastrotomy*.” Performed immediately on the death of the mother this operation offers some hope of saving the child's life. This rarely occurs, however, for deprived of oxygenated blood from cessation of maternal heart-action, and placed in unusual and inappropriate surroundings, the child soon dies.

Hence without losing precious time listening for the fœtal heart-sounds, the physician, after recognizing fœtal movements (by means of palpation) must map out the fœtal tumor by the same means, and then cut. He should proceed just as if he were operating on the living subject, but before any



steps are taken he must *by touch* discover the condition of the mother's genitals, for should rupture have occurred at an advanced stage of labor the child may be extracted more readily through natural channels.

*Cæsarean Section on the Living Female.*—Toward the close of the fifteenth century gastro-hysterotomy was performed for the first time on the living subject. A century later Rousset published a monograph, in which he recorded seven successful Cæsarean sections. But as the greatest surgeons of the day failed, the operation would have sunk into oblivion had not Bauhin added successful cases to Rousset's list.

The majority of seventeenth century writers proscribe the operation. But Simon, in the seventeenth century ("Mém. Ac. de Chirurgie," 1749), published accounts of sixty operations, some of which were undoubted successes, and which thenceforth assured gastro-hysterotomy a place among legitimate obstetrical operations.

If successes were published so were failures, and the seventeenth century teems with them. A. Paré, Guillemeau, Viard, Marchant, Peu, Mauriceau, all experienced failure in performing the Cæsarean section; and when, later on, Sigault proposed *symphysotomy*, a vigorous conflict (*lutte acharnée*) waxed between the partisan surgeons of the two operations, and it became impossible, from their passionate disputes, to distinguish failures from successes.

Symphysotomy finally gave way, and for a quarter of a century Cæsarean section reigned supreme.

Obstetricians, worthily emulating the surgeons, endeavored to perfect *their* methods of operating so as to secure a definite position in science for gastro-hysterotomy, and in 1827 the younger Baudelocque invented the cephalotribe. The many improvements made in this instrument, and above all the adoption of Pajot's method (q. v.), led to further abandonment of the Cæsarean operation.

Besides, the results—in Paris at least—of the operation were far from encouraging. True, nearly all had suffered the operation in hospitals, which contributed not a little to the mortality. In 77 operations performed in Paris from the sixteenth to the eighteenth century only 6 successes were recorded (the last in 1787), and of these 6 who recovered *not one* was operated on in a hospital. Hence Pajot states that the Cæsarean section in a hospital, or in a great and populous centre, must be looked on as a last hope, and only to be thought of when a pelvis is deformed to the extreme degree from rickets. But these very six successful cases, and the results, sometimes successful, obtained by country practitioners, stand to protest against the reprobation urged, perhaps too hastily, against this operation.

On the other hand, the marvellous results recently obtained by ovariectomy, aided by Listerism, an operation just as dangerous *per se* as gastro-hysterotomy, impresses the unprejudiced physician that some day we shall see an operation established that results in saving two lives.

With our present knowledge, and with the narrow limits of this work, we shall merely give a *résumé* of (1) the indications, (2) the conditions, (3) the preparatory treatment, (4) the manual operation, and (5) the after-treatment of simple Cæsarean section.

We shall then briefly consider gastrotomy performed on the living subject; and in Section 4 we shall describe Porro's operation.

Before commencing, let us in the interest of science and humanity demand that in the Paris lying-in hospitals this operation be never performed. L'Assistance Publique is rich enough to send to a healthy country place any woman on whom we have decided to perform an abdomino-uterine incision. It is useless to state that the successes obtained by modern surgeons in ovariectomy have been where the women were in private hospitals or in perfectly healthy and well-ventilated houses; for we must not imagine that Paris air necessarily compromises the results of all grave operations performed within its limits.

I would absolutely exclude it, however, from all "Maternités;" for hygiene and ventilation in this grand city [Paris] have been so improved within the last twenty years that they nearly compensate for the great overcrowding of the population. The excellent sanitary condition of the city after its two sieges, and the rarity of cholera epidemics, are proofs of what I state.

*Indications.*—Whenever the pelvis measures less than  $2\frac{4}{5}$  in. repeated cephalotripsy without traction may be tried; but clinical experience teaches us that even in the skilful hands of the inventor of this method life has not been saved when the antero-posterior diameter was under 2 in.

Away from Paris, far from the discoverer of the operation and without the perfected instruments that so powerfully contribute to success, the indication for Cæsarean section has the first-named limits if the child's life is to be assured, and if we hope to offer as good a chance to the mother as by cephalotripsy.

Pajot once told my students, during my clinique which he honored by his presence, that in one of the Départements of France, even in the chief town of the arrondissement, there was not a cephalotribe to be had when it was needed for a case of dystocia occurring in the wife of a fellow-physician! It is needless to add that physicians in that Département were less acquainted with major operations than with the use of the lancet, and that the woman's life would have been less compromised by their performance of the Cæsarean section than by their use of the cephalotribe.

*Conditions.*—To perform the Cæsarean operation:

1. Labor must have begun and the cervix should be slightly dilated, so that the womb, contracting on itself, renders consecutive hemorrhage less liable to occur, and permits free exit to the lochia.

2. The membranes must be intact, or only recently ruptured; in the

former instance the womb retracts better, and there is less danger of wounding the foetus, while in the second case the viability of the child is not compromised.

3. No attempt at extraction must previously be made, so that the child may not lose a single chance of life, and the mother may be spared the slightest secondary inflammation.

4. The presenting part must not be too much engaged in the pelvis, for then we would have to perform traction on the foetal trunk to bring the child out of the abdominal incision.

*Preparation.*—The woman must be prepared for the operation by a proper hygiene and diet, repeated baths, and, if she is plethoric, by small bleedings.

The instruments, along with the articles necessary for the first dressing, should be arranged by the obstetrician himself.

Chloroform, ammonia, a female catheter, a razor (to shave the part upon which to cut), two bistouries (one curved, the other straight and probe-pointed), a dissecting-forceps, scissors, curved needles with waxed thread, ligatures, a quill or bits of rubber tube for deep quill- or pin-sutures, diachylon bandages, a large napkin with a hole cut from the centre, compresses, lint, a body-bandage, pins of various sizes, ergot, a good generous wine (to be given if the woman be exhausted), water, new sponges, and even a small forceps. This is the outfit necessary in all cases.

In this more than at any other operation are numerous intelligent assistants required. Six at least should be present; two to hold the woman immovable, one for anæsthetics, one to aid the operator, a fifth to manage the sponges and prevent the blood (which flows in abundance from the cut womb) from embarrassing the operator, and a sixth, the most important of all, to hold the uterus in contact with the lips of the wound. To do this he must lay his flat hands upon the median line, the radial borders lying as close as possible to the line along which the incision is to be made. Thus displacement of the womb is avoided; and what is of greater importance, intestinal protrusion through the wound and extravasation of fluid into the peritoneal cavity are also prevented.

The woman is then put on a rather low bed, the back and head supported by pillows, the limbs slightly flexed and supported by a cushion slipped beneath the popliteal spaces. The urine should be drawn with a catheter. A special apparatus should impregnate the air of the operating room with carbolic acid, and all the rules given by Lister should be followed.

*Manual Operation.*—Many methods are in vogue. Lauvergeat (who performed two of the successful cases referred to) makes a transverse incision over the fundus uteri; Levret, over the lateral walls, parallel to the external border of the rectus muscle. The womb during pregnancy turns upon its axis, bringing its *left* border nearer the median line, and as



toward the sides of the organ the peritoneum is less adherent and the vessels are more numerous, I prefer an incision upon the *right* half of the uterus. Velpeau proposed to cut upon the fundus, making a semi-elliptical incision. Another method consists in cutting above the Fallopian ligament to avoid the peritoneum. But the only plan now followed is that of Mauriceau, who cuts in the *linea alba*, thus avoiding the epigastric vessels and getting, subsequently, an easier cicatrization of the abdominal walls. Regarding twisting and inclination of the uterus, Guéniot advises that an oblique cut be made on the *linea alba*, even if a few branches of the epigastric be cut. After percussion shall show that there is no intestine between the anterior uterine wall and that of the abdomen, the operator is to stand on the woman's left, and holding the tissues by means of the thumb and fingers of the left hand, incises vertically with the curved bistoury, beginning  $1\frac{1}{2}$  in. above the pubis and ending  $\frac{4}{5}$  in. below the umbilicus. He divides skin, fascia, muscles, and peritoneum. The cut is 6 to  $6\frac{3}{4}$  in. long. In rickety women whose short stature does not permit an incision over 6 in. long, prolong the cut above the umbilicus, passing to the left of it.

When the surgeon reaches the first layer of peritoneum he is to redouble all his precautions; puncturing it with a little probe and then inserting the index and middle fingers of the left hand, he is to guide the blunt bistoury by his fingers, thus surely avoiding wounding of the intestine, should a loop be in the way. A few drops of a straw-colored fluid flow out after this last incision.

The womb is now exposed and looks like a large, red, tense globe. With the curved bistoury cut the peritoneal covering and the uterine tissue to the membranes, as nearly as possible in the median line where the peritoneum is most adherent. Reach the ovum by puncture, later using the blunt bistoury, as when cutting the parietal peritoneum, so that the child be not wounded. If the placenta is met it is better to detach one side than to cut it, the latter method being more dangerous on account of hemorrhage. Some advise antecedent rupture of the membranes through the vagina, to avoid fluid entering the peritoneal cavity. (Guéniot.) Extract the child, grasping it by the part that presents in the womb, cut the cord, and give the infant to some one of the bystanders.

Sometimes the womb contracts around the neck of the child, so that it becomes necessary to use the forceps or enlarge the uterine incision.

[This affords us good reason, when it is practicable, for seizing and removing the largest part of the foetus, viz., the head, first, an enlargement of the original wound in the uterus by tearing being very undesirable.—Ed.]

Immediately after extraction the womb contracts forcibly (especially when it has been distended with liquor amnii), detaches the placenta and pushes it toward the cut. We only have to lift it out, taking care to twist the membranes so that nothing may be left in the womb. Insert the



hand into the womb, to clear out any clots which may be there, and also to establish an easy channel of communication with the vagina through the cervico-uterine orifice. *Peritonitis* being the common cause of death, the toilette of the peritoneum must be carefully attended to. The minute rules followed by Péan, Kœberlé, and others, in this respect, have been



FIG. 105.—Caesarean Section.

attended by successful ovariectomies. But if in this last-named operation cleanliness is easily insured, it is far from being so in Caesarean section, for here the womb occupies the opening of the wound. The obstetrician must be most careful in all cases, and we think the increased size of the abdominal incision (Stoltz' method) favors cleanliness of the peritoneum. The fear of herniæ and of the necessity of increasing the sutures need not restrict the cut to the first-named limits.

Guéniot, to avoid all implications of the peritoneum, proposes to operate outside the abdomen (*Bull. de Thérapeut.*, 1870). This, indeed, is what is done in Porro's operation (Muller's method).

Planchon advises carrying the end of the cord through the cervix into the vagina and to deliver the placenta through the natural channels, a difficult and, besides, a useless operation.

*Subsequent Treatment.*—As uterine contraction occurs, aided, perhaps, by a small dose of ergot, the wound, which was six inches long, is speedily diminished until it measures about two inches; hence Baudelocque stated that closing of the uterine wound should be left to nature. But since retraction is not lasting it has been proposed to aid the closure of the uterine wound by suture. On the other hand thread, as well as the metal suture, does not follow the womb as it progressively retracts; hence relaxation occurs wherever the sutures are placed, thus allowing the lochia, pus, and blood from the uterine vessels to enter the peritoneal cavity, usually to cause death of the mother. However, recent successes prove that sutures in the uterine wound do augment the chances of recovery after Cæsarean section. (*Bull. de Thér. Méd.-Chir.*, February 15, 1874, p. 108; *Arch. f. Gynæcol.*, vol. 5, p. 365.)

Dr. Grandesso-Silvestri (of Vicence) has employed his method of elastic ligation to sutures in the womb. His first attempt resulted in a success for both mother and child (*Gazette Obst.*, No. 3, 1874). For myself I firmly believe that sutures in the uterus, careful hygiene and choice of residence for the woman operated on, have largely to do with the success of Cæsarean section.<sup>1</sup> The utmost care should be taken of the peritoneum (*vide supra*), the abdominal wound should be carefully cleansed, and the lips should be approximated throughout the whole extent by the *pin-suture*, an opening being left below for exit of pus.

The dressing will be completed by strips of adhesive plaster, alcoholic compresses over which are layers of wadding, all enclosed by a body-bandage. Or, on the other hand, Lister's method may be followed throughout. The woman is to lie several days upon the bed where the operation took place, and is to be kept as immovable as possible. Liquid food is to be given altogether. The catheter is to be used daily, and opium is to be the sole drug employed.

As a prophylaxis against inflammatory lesions, ice or cold may be employed within and without. (Metz, of Aix-la-Chapelle, and Béhier; also Verrier, *Gaz. des Hôpit.*, July 31, 1866.) This can be done without prejudicing antiseptic treatment. Finally, the indications will consist in combating morbid phenomena by measures suited to their kind and their intensity. These we cannot give in detail.

After four or five days the dressings may be changed; until then nothing more should be done than to withdraw from under the patient the soiled sheets, and combat constipation by enemata. Watch for the

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<sup>1</sup> See a letter from Stoltz, Honorable Dean of the Faculty of Medicine at Nancy, to Dr. E. Verrier, in *Gaz. Obst.*, No. 6, 1874.

occurrence of intestinal herniæ; if they occur reduce them to avoid strangulation and gangrene.

Only at the fourteenth or fifteenth day may we remove the sutures, for then the lips of the wound should be agglutinated by new tissue, and sufficiently adherent to stand absence of support. As for the uterine sutures they are best left in the abdomen. Perhaps the nature of the suture used will influence the result—silk, elastic, catgut, etc.—each may constitute a little foreign body which the womb tolerates. At any rate cases reported by Gürtlen, Grandesso-Silvestri, etc., are in favor of the harmlessness of sutures left in the womb.

A brief consideration of *gastrotomy*, also called laparotomy, performed on the living subject, is also called for.

An incision through the abdominal walls is indicated when there is a rupture of the uterus, for then the child is to be extracted from the peritoneal cavity. In extra-uterine pregnancy the evacuation of a foetal cyst is also performed by this means. In the latter case caustics should be preferably used (Depaul's Clinic, 1866). Their use has the advantage of producing adhesions between the cyst and the abdominal wall—adhesions which are greatly in favor of the success of the operation.

But in rupture of the uterus the foetus is *alive* in the abdomen; haste is desirable; hence primary gastrotomy is the better operation of the two.

In Jolly's thesis on "Rupture of the Uterus" (*Gaz. Obst.*, 1873), he states that of 38 gastrotomies for extraction of the child, 26 mothers recovered. One woman had *twice* undergone the Cæsarean section. The convalescence lasted between twelve days and three months, and many of them had been operated on when in miserable health.

Now, when this operation follows previous rupture of the uterus it is not without reason compared with a Cæsarean section; hence we leave to the reader to deduce his own conclusions as to "*curability*," from the data just given.

[In some cases when the lacerated and irregular character of the uterine rent would indicate that, after the most careful closure by stitches, primary union would fail to occur, and some escape of blood into the peritoneal cavity would continue after the operation; in cases in which, owing to the softened and degenerated condition of the uterine wall, the ordinary tension of sutures would cause them to tear the tissues; or when pelvic deformity is present to a degree to make it undesirable that a woman should again become pregnant, it would be quite proper to raise the question of the advantage which might be gained from ablation of the uterus, as is done in the Porro operation.—Ed.]

§ 4. UTERO-OVARIAN AMPUTATION: THE PORRO OPERATION.—Since our last edition great progress has been made in the performance of the Cæsarean section.

Pinard gives a *résumé* thereof in the *Annales de Gynécologie* (1879). To

the Cæsarean operation which has just been described, and which has saved children's lives, we must add amputation of the uterus and its appendages, which places the woman in infinitely better condition as regards the immediate sequelæ of the operation. Moreover, by extirpation of the womb and the ovaries, the new method assures future immunity against the fearful conditions that make any such operation necessary. There is no chance of her becoming pregnant; and there are, alas! cases which justify the moral side of such an extirpation.

Professor E. Porro, of Pavia, recognizing the almost utter impotence of sutures to bring about union by first intention in the uterine wound, and remembering the fact that a large gaping wound is always left through which blood and septic fluids susceptible of causing inflammation can escape into the peritoneal cavity, and relying upon the marvellous results obtained by surgery in ovariectomies, concludes that amputation of the womb and its appendages, performed with Listerian precautions, is the sole means of doing away with puerperal complications following gastro-hysterotomy.

He had already experimented on animals and knew the results he obtained from such experimentation. Familiar with his own method, from his very first operation he was successful, both for mother and child, although the operation was practised in a large lying-in asylum and while an epidemic of puerperal fever was prevailing.

Subsequently, says Pinard, imitators have been numerous; and eliminating 5 cases, which were complicated and which are not included in the statistics, out of 33 utero-ovarian amputations after hysterotomy, we find 18 successful cases and 15 deaths, *i.e.*,  $54\frac{5}{10}$  per cent. of recoveries.

This, it is true, is not enough from which to judge; but never was simple Cæsarean section as successful as this.

We are convinced that still more favorable results will be obtained, when Muller's method (already proposed by Guéniot for the ordinary Cæsarean section) shall be generally adopted.

This method consists in operating *outside of the abdomen*, *i.e.*, after having incised the abdominal walls as in Cæsarean section, the uterus is brought outside, while assistants prevent exit of the intestines; and when the uterus is out of the abdomen, the operation consists in, (1) application of a ligature-tightener to the cervix; (2) a long cut on the womb to allow exit of its contents; (3) excision of the uterus and appendages. The antiseptic method is to be combined in all its details. With these precautions the woman is not liable to hemorrhages; and no fluid can get into the peritoneal cavity.

What is to be done with the pedicle? Shall it be fixed to the abdominal wall or left in the cavity of the abdomen?

I refer physicians to the recent statistics concerning ovariectomy for the answer to this question.



[LAPARO-ELYTROTONY: THE THOMAS OPERATION.—When pelvic deformity exists to a high degree it may be advisable, as has been said, to extract the child in a way that will avoid its passage through the pelvis. This is called for not alone in the interest of the child, for statistics of craniotomy and embryotomy, when performed through pelves greatly contracted, show a high rate of mortality for the mother. The operation of laparo-elytrotomy meets these indications, and differs from Cæsarean section inasmuch as the peritoneum and uterus are not wounded. In deciding with reference to the operation in a given case, the size of the child is to be considered as well as the degree of deformity.

Preliminary to the operation the cervix must have been dilated, either spontaneously or by the aid of the Barnes bags, the bladder and rectum being empty. An incision is made on the right side, parallel to and an inch above Poupart's ligament, beginning above the anterior-superior spine of the ilium and extending to within an inch and three-quarters of the spine of the pubis. The inner extremity of the incision should be about an inch and a half above the pubis. The abdominal muscles are then divided throughout the line of the incision. The peritoneum, when reached, is to be carefully lifted up from the iliac and transversalis fasciæ until the fingers reach the vaginal wall.

The uterus is lifted forcibly upward and to the left. A metal catheter kept in the bladder indicates the situation of that organ, which must not be injured. A blunt wooden instrument as large as a medium-sized rectal bougie should be passed into the vagina and pressed upward, to bring the vagina as near to the abdominal wound as possible. A small wound is then made in the vagina. This must be as low down as possible, at least an inch and a half below the cervix. By this low incision the ureter, which is situated at a higher level, and the pouch of Douglass are avoided, and there are fewer vessels encountered liable to be injured. The vaginal wound should then be enlarged by tearing with the fingers pressed forward toward the pubes and backward in the direction of the sacrum. The fundus of the uterus being then brought well to the opposite side, the operator proceeds to draw the child through, successively, the os uteri, the vaginal wound, and the abdominal incision.

Removal of the child may be accomplished by the forceps, or version, the placenta following by the same channel. Hemorrhage should be met by pressure or by styptic applications. Vesico-vaginal fistula, if occurring, should be closed by silk or catgut sutures. A drainage-tube should be passed through from the abdominal wound into the vagina, and the greater part of the abdominal wound closed by stitches and adhesive plaster.

During healing the wound should be kept clean by antiseptic injections.—Ed.]

## APPLICATION OF FORCEPS AND OTHER OBSTETRICAL OPERATIONS.

BY PROFESSOR PAJOT.

Before one proceeds to apply the forceps it is indispensable (1) that the orifice should be dilated and the membranes ruptured; and (2) that the pelvis should allow the passage of the instrument. It is most favorable when the head is engaged and fixed in the superior strait. The forceps is only applied to the head, though, when the child is dead, the pelvis may be seized.

Forceps operation is indicated whenever, during labor, accidents threaten the health or life of mother or child, and the above-named first and second conditions co-exist (inertia, hemorrhage, eclampsia, procidentia, etc.).

*The application of the forceps is divided as follows:*

## DIRECT APPLICATION IN VERTEX PRESENTATIONS.

*(Made only in the superior strait.)*

Direct Positions: { Occipito-pubic.  
                              { Occipito-sacral.

*Preparations before applying Forceps in any Case.*—Position of woman as in version. Four assistants. Empty bladder and rectum. Position and presentation accurately made out. Warm instrument in lukewarm water; oil it on its external surface.

## FIRST STAGE.

*Introduction and Fixation of Forceps.*

Each half of the forceps consists of blade, lock, and handle. One has a pivot and is called the left, male, or pivot blade. The other is the right or female blade (mortised).

*Left blade.* Held in the left hand, always applied toward the mother's left, and always first applied. It ought to be held as the hand holds a pen in writing. The right hand of the operator oiled on both surfaces; two fingers of this hand in the vagina and always in the os, if it can be reached, precede and guide the introduction of this blade. Two fingers of the right hand (sometimes all the hand except the thumb) being thus introduced the left blade is directed parallel in the woman's right groin, the lock looking upward. Lower the lock between the woman's legs in proportion as the blade passes between the hand of the operator and the head of the fœtus. The blade is introduced in the direction of the axis and the handle of the blade (introduced at the left) is now placed parallel with the opposite thigh and given to the care of an assistant.

*Right blade.* Inverse rules: with the right hand to the right, introduced after the former, etc. In all cases the second blade rests on the first.

## SECOND STAGE.

*Locking.*

The two blades being placed upon the same plane and the mortise facing, or alongside of the pivot (according to the kind of joint), the two are gently approximated and locked. If difficult extraction is expected a napkin may be wound around the handles.

## THIRD STAGE.

*Extraction or Engagement.*

First be positively certain that the head, and the head only, is grasped. Then begin traction and very, very slow lateral motion during contractions, if the latter are present. The arm, not the body, must do the pulling.

In *occipito-pubic* positions traction is downward, and—the occiput engaged—the forceps is *raised* (1).

In *occipito-sacral* positions traction is upward, and when the occiput engages the forceps is *lowered* (2).

These are the sole methods of engagement of the head (in vertex presentations). All oblique positions must be converted into occipito-pubic, or occipito-sacral. (*Vide* "Oblique Application.")

*In face presentation, the trunk out, see "Oblique Application."*

APPLICATION OF FORCEPS AND OTHER OBSTETRICAL OPERATIONS.  
*Continued.*

## OBLIQUE APPLICATION IN VERTEX PRESENTATIONS.

*Oblique Positions :* { L. O. A.  
R. O. P.  
R. O. A.  
L. O. P.

*General Rule.*—To grasp the head at the ends of the bi-parietal diameter the concavity of the forceps must always be turned from the side of the foetal region which is to be dragged behind the pubis. (In anterior positions this is the occiput, in posterior it is the forehead.)

FIRST POSITION.  
L. O. A.  
(Left occipito-anterior.) { The *occiput* is the foetal part to be brought under the pubis. It is forward and to the left, hence place concavity of forceps to the left and in front, left blade behind head of foetus, the right in front (lock the instrument to make sure). *Left blade* in the left hand, to the left and backward and first introduced. The left blade is at once applied to the spot where it is to remain throughout. The *right blade* passes along the right side of the pelvis, then by a *spiral* movement (Lachapelle) it is brought to its final site. Finally, the same precautions in all three stages as in "direct"—locking, traction, rotation of occiput underneath pubis, then engagement as in occipito-pubic. (*Vide* "Direct Application" (1).)

SECOND POSITION.  
R. O. P.  
(Right occipito-posterior.) { Same as for first position (substituting forehead for occiput). But *rotation into the sacrum* and engagement as occipito-sacral. (*Vide* "Direct Application" (2).)

THIRD POSITION.  
R. O. A.  
(Right occipito-anterior.) { Same as for first, only occiput is to the right and in front; hence concavity to right and forward, then the left blade is in front of the head of the foetus and the right behind (lock and make sure all is right). Engage as occipito-pubic.

FOURTH POSITION.  
L. O. P.  
(Left occipito-posterior.) { Same as for third position (forehead replaces occiput). Engage as occipito-sacral.

It has even been proposed, in posterior positions (in the second and fourth), to drag the occiput forward (Smellie, Danyau).

*Transverse Positions.* { As in corresponding anterior positions. (*Left* transverse as in the first position; *right*, as in the third.)

*Face Presentations.* { For anterior positions, as in vertex (*chin* replaces *occiput*). For posterior positions, either try and flex the head (irrational), or a couple of applications of forceps to bring forward the chin.

*The Trunk Out.* { Same rules as for vertex. Manual engagement should always be preferred when this is possible. The engagements are modelled exactly upon spontaneous engagements. (*Vide* works on obstetrics).

## APPLICATION OF FORCEPS AND OTHER OBSTETRICAL OPERATIONS.

*Continued.*

## COMPLICATIONS AND DIFFICULTIES IN APPLYING FORCEPS.

## FIRST STAGE.

*Introduction and  
Fixation of Forceps.*

1. *Position not made out.* Apply forceps directly. (If rotation of the head has not occurred, it sometimes happens that it occurs after the introduction of one blade, or between the two blades, or the head may turn and the forceps with it.) If a movement of rotation does not take place, the direct application will be irregular; yet, in general, the engagement will occur even in this case. 2. *The second blade cannot be inserted.* Take out the first and begin with the other. In oblique applications there is always one blade difficult to insert, this is the anterior (right in first and second positions, left in the third and fourth). *Begin with this one*, but in order to lock (the mortise being underneath the pivot in the first and second positions, since the second blade always rests above the first) we are forced—in these two positions—to cross the arms of the forceps. 3. *The end of a blade strikes some obstacle.* Pull it back a little and guide it anew. Never use force against resistance. *Note.*—Force must never be used in this stage, the blade should slip in by its own weight, so to speak, the hand merely guiding it. It is well inserted when, on gently pushing it, it easily enters farther.

## SECOND STAGE.

*Locking.*

- Cannot Lock.*—1. Because the pivot and the mortise are not on the same plane. Gently twist each arm of the forceps so as to approximate them; work them together gently. 2. Because one blade is deeper than the other. Pull the deeper and push the other; try and work the joints together. 3. Because the arms of the forceps gape widely and cannot be approximated. It is probable that the head is grasped irregularly, or grasped by an end of the blade. Insert the blades farther with great caution, following the axis. (When the head is high up, the forceps may lock within the vulva or vagina; pivot and mortise are then easily approximated.)

## THIRD STAGE.

*Extraction of Fetus.*

1. *The head is immovable in spite of all traction.* (This is seldom seen except in deformed pelvis or with very large heads.) Give up the forceps. Take them out and begin a few hours later. (*Vide* "Table of Deformities of the Pelvis.") 2. *The forceps slips.* Endeavor not to pull with the body or the instrument will slip out rapidly, the soft parts will be torn, and the operator will tumble backward with his forceps. 3. *Uncertainty concerning position.* Try and make it out when head is in the vulva; if still in doubt, work twice as slowly to induce engagement. If contractions exist the forceps may in some cases be withdrawn. If it is seen that the application is very irregular the same rules hold good. 4. *The perineum threatens to rupture in spite of precautions and slowness.* Cut the sides of the vulva below, by two little incisions, with the scissors. (This proceeding—clearly useful in some cases—should be sparingly indulged in.) 5. *The end of the blades being in the vulva the head engages.* Unlock and take out one blade after the other, following the axis. 6. *The head engages, contractions cease, the child is in danger.* Tell the mother to bear down; feel for the axilla, do not disturb the arms, induce rotation of the shoulders, and deliver trunk slowly, pulling downward.



## APPLICATION OF FORCEPS AND OTHER OBSTETRICAL OPERATIONS.

*Continued.*

## CEPHALOTRIPSY.

Same rules as for direct application of forceps: be doubly cautious on account of the force of the instrument. Have the head fixed by an assistant sitting on the bed. Carry each blade as far back as possible (*running along the perineum*). The head grasped, bring the arms of the forceps absolutely together with the vise. Extract with traction, at times forceful, turning concavity of the cephalotribe slightly to left or right, to put the *flattened* part of the head in the *narrowed* portion of the pelvis. Try and work it out. Repeated cephalotripsies, two or three crushings at a *séance*; no traction; cranium, thorax, pelvis to be crushed one after the other, according to the engagement.

## CRANIOTOMY.

Done with Smellie's scissors or any kind of strong and pointed instrument. General precautions to be taken. Position of the woman as in other operations. Introduce the whole hand except the thumb and slip the instrument up to the head. Lift up the anterior portion of the os, if it is in the way. *Look for neither suture or fontanelle*. When the point of the instrument is up against the skull press the handle down strongly and thrust it in. (Blackish blood and cerebral matter). Enlarge the opening sufficiently and carefully withdraw the instrument. (Before practising cephalotripsy it is well to begin by perforating the skull.—P. Dubois.)



## Part 6.

# MANAGEMENT OF EARLY INFANCY.

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## CHAPTER I.

### ARTICLE I.—FIRST INDICATIONS.

WE do not wish to omit, in this work, anything that may be of interest concerning the health of the infant, particularly as regards the conduct of the physician and midwife. We have already referred to those cases where the child was born, to all appearance dead, and to the treatment appropriate to them. The foetus is often born with ecchymoses, sero-sanguineous tumors, or cephalæmatoma.

In the first two instances there is nothing to be done; but when the sero-sanguineous lump is very large, a compress or an evaporating lotion may be locally applied. When a child has a cephalæmatoma, the treatment depends on the size thereof.

*Cephalæmatoma.*—This is a circumscribed, fluctuating tumor, formed by an extravasation of blood under the pericranium. It in no wise influences the color of the skin, which is never adherent to it. It is usually located upon the parietal bone, nearer the upper than the lower portion, more often on the right than the left. But it may exist on both sides in the same child. It varies in size from a mere speck to a mass 4 by 3½ in. (Robin.) Its base is surrounded by a bony, irregular rim, which to the touch feels as though perforation had occurred. This bony rim diagnosticates it from a sero-sanguineous tumor. Three varieties are recognized: (1) sub-aponeurotic cephalæmatoma (rare); (2) sub-pericranial cephalæmatoma (the commonest form); and (3) supra-meningeal cephalæmatoma, from blood extravasated upon the internal surfaces of the bones, and separating these from the detached dura mater. The last two varieties may co-exist, and then they may intercommunicate from loss of bony substance, as can be seen in specimens belonging to Prof. Depaul.

Although the exact cause of this peculiar condition is unknown, we are led to believe that the mechanism by which a sero-sanguineous tumor is formed is different from that of cephalæmatoma, which must commence during intra-uterine life. Yet traumatic cases have been recorded. When the tumor does not seem disposed to disappear of itself, we must use compression, lead plasters, or paint with collodion. In 1872 I saw an infant with a very large cephalæmatoma, which I treated with collodion, whereupon it disappeared, doing the child no harm. Puncture, and even cautery, have been advised for large cephalæmatomata, but the last-named is dangerous. A large incision is no better than a puncture. Whenever such a tumor is opened soon after birth the bone is always found healthy, but in long-standing cases the bone is partly absorbed or even carious.

*Fœtal Paralysis.*—Paralysis in the new-born is generally the result of compression of the motor nerves of the paralyzed parts by forceps, or against some bony projection of the pelvis. Traumatic vesicles upon the face have also been found after forceps delivery. (Guéniot.)

Paralysis of the facial nerve has only been observed upon one side, and has always resulted from compression by the forceps of one of the larger branches of that nerve. Once, however, I saw it follow spontaneous delivery. It is not apparent when the child is quiet, the symmetry of the face is then preserved, but the eye may be half opened. When the child cries the deformity is great, the angle of the mouth being drawn toward the sound side. This condition, which may render nursing quite difficult, is usually of short duration, lasting from a few days to five or six weeks at most.

The end of the forceps may slip by the jaws and impinge violently upon the supra-clavicular region, so as to contuse parts of the brachial plexus, and induce temporary paralysis of the arm without affecting its sensibility.

Paralysis is sometimes limited to the deltoid muscle, and seems to be the result of compression of the circumflex against the humerus at the point where this nerve runs deep into the muscle.

These palsies, when not congenital, soon spontaneously disappear by the aid, at most, of rubefacients and evaporants. Facial paralysis demands care as to feeding, if the act of sucking is embarrassed; and the eye that is partly opened is to be protected from the light.

*Tongue-tie.*—Among congenital deformities is tongue-tie—the prolongation to the tip of the tongue of its frænum.

This may prevent the child from nursing, and the frænum should be cut  $\frac{1}{2}$  to  $\frac{2}{3}$  in. back from the tip, carefully pushing the base of the tongue away by means of a spatula. By pinching the child's nose for an instant we can make it open its mouth. Even if the tongue-tie is not remedied the child soon learns to suck, becoming accustomed to it very quickly.

Other deformities that are to be remedied immediately are imperforate



anus, umbilical and other congenital herniæ, etc. Upon such subjects we refer our readers to special works on surgery, herniæ being easily reduced. Inflammation at the base of the cord is very rare, unless the ligature has been placed too close to the abdomen. Erysipelas and even peritonitis may follow if an epidemic is prevailing.

#### ART. II.—NURSING.

Nursing or feeding of the new-born infant is a physiological function that naturally devolves upon the mother.

Certain conditions may prevent the mother nursing her child: (1) when nursing is not beneficial to the child; (2) when it is harmful to the mother. The physician is always consulted to find out whether the mother may suckle her child, and in case she should not the physician is to choose the wet-nurse. Generally speaking, we should be readier to have the child suck the mother than anyone else, and we should even use our authority to induce a mother to suckle her child, calling attention to the advantage she gains in regard to her own health by so doing; and especially to the disadvantages of wet-nursing, deplorable results of which have recently been stated in the works of Drs. Brochard, Monot (of Montsauche), and others. Along with natural, we shall consider artificial feeding, and also nursing by means of the female of one of the animal species.

§ 1. NATURAL NURSING.—CONDITIONS UNDER WHICH A MOTHER CAN NURSE HER CHILD.—The mother's constitution must be excellent if not robust, for nursing is exhausting. Some mothers have by continuing lactation been predisposed to consumption. A nurse should have good lungs, a healthy stomach, and good teeth, all of which so often accompany a good constitution. Good teeth are necessary to masticate the food, hence digestion being thus secured, and the milk consequently more nourishing. We must carefully inquire as to hereditary family diseases, so as to prevent mothers presenting such tendencies from suckling their children. The condition of the father should also be taken into account. In all cases of doubt the physician should confide the child to a wet-nurse. Should the mother suckle her children, she must begin with the first-born. Among the people it is generally believed that the mother of many children loves that one best that she has suckled; hence it will be well, once the first child has been thus nursed, to have the mother suckle all the others. A recently delivered woman has after-pains, slight in primiparæ, but so intense after the second and third child that they are well-nigh unbearable. A woman should therefore nurse her first child, for then with subsequent children the after-pains will not be severe. Besides, the sucking-action on the nipples induces a useful derivative effect upon inflammations of either the uterus or its appendages. The mother's mind should not be too impressionable or romantic, and if she is a woman of fashion, she must give

up balls and parties to devote herself to maternal duties. Hence, not from caprice but from serious reflection must a mother undertake to nurse her child. The physician should examine the breast and nipples. Three kinds of the former may be recognized: (1) the *hemispherical*—the best—which is white, rounded out, tense, resistant, and intersected with bluish veins; (2) the *pear-shaped* breast, which is desirable provided the other (above named) properties exist; and (3) the *flat*, pendulous, and patulous breast, which is the least desirable. The nipple must neither be too large nor too small; some seem to be retracted into the breast, and no child can nurse upon such a nipple.

In primiparæ the nipples are always poorly developed: they are to be formed by means of a cylinder of wood placed upon the breast, the upper portion being of rubber or ivory (Charrière). It is emptied of air by sucking and then the nipple protrudes into it and “is formed.” Inflammations of the *mammæ* are more frequent when the mother nurses her second or third child without having suckled the first-born.

At the base of the *mammæ* cracks are often developed, which are best treated by palliatives, cacao butter, rose-cerate, collodion and the like. An artificial nipple is much employed, but the best remedy is to cease suckling from that side for a time.

The mother who nurses her child, urged by the little one’s shrieks and by the advice of ignorant friends, gives the breast whenever the baby cries. This is a deplorable practice on the mother’s part, for it exhausts her strength and the child’s stomach.

We must regulate the nursing-time for the sake of both mother and child, and there should be two hours interval between meals. But should the child sleep three hours, do not wake it to feed it. When it sucks let it cease of itself, never take it away suddenly. At night let the child suck at 10 to 11 P.M. for the last time, then take it from the mother and do not let her have it again until 5 or 6 A.M., when it takes its first meal for that day. In this way the mother will have sufficient rest and there will be no fear of exhaustion. It will also establish good habits and good digestion for the baby, though he will shriek during the first four or five nights. Proper amount of sleep is especially necessary to women who nurse their children.

*Quality of the Milk.*—Beginning at the third month of pregnancy the breasts commence to swell and become rounded, the subcutaneous circulation becomes apparent, the skin over the *mammæ* exhibits “chinks” and is streaked like the skin over the abdomen. At the same time there is an attempt at secretion in the gland, whence results a peculiar product—*colostrum*, a kind of imperfectly elaborated milk. It may be so abundant that it flows away spontaneously: this indicates an abundance of milk in the future. Donné (Paris, 1840) thought he could deduce the future *quality* of milk from an examination of the *colostrum*. (See p. 38 of his work).

At the end of pregnancy and after delivery the secretion gradually assumes the qualities and appearance of milk; and the child may be put to the breast as soon as the mother has recovered from her fatigue. This aids formation of the nipple and opens the galactophorous ducts. Colostrum has purgative properties which facilitates the expulsion of meconium. By waiting till the milk "rises in the breasts" before putting the child to breast, we not only lose the advantages of the purging action of the colostrum but the great enlargement of the breasts will then prevent the child from sucking. A weakly child, moreover, can not wait so long and it *may* suffer from hunger.

After the breasts fill, a drop of milk on the nail should be of a bluish white color, not too watery, and on bending the finger, it should not drop off too quickly.

Upon examination press on the breasts to make a few drops run out; thus we get rid of colostrum that would lead to an erroneous estimate of the milk. Like that of all animals, the milk of the human female is composed of a transparent fluid, in which float oil-globules a little larger and more uniform in shape than those of the milk of other animals. Epithelial debris is sometimes discovered in it. Any *lactoscope* may give us an appreciation of its qualities, but we prefer Marchand's *lacto-butyrometer* when we wish to find out how much butter the milk contains. This instrument is composed of a glass tube closed at one end, and divided into three equal parts. In the lower part the milk to be examined is placed, in the middle portion ether is poured, and alcohol fills the upper third. Agitate the whole, and place the tube in a wet sand-bath heated to 40° C. (104° F.). The quantity of contained butter condenses at the upper part of the fluid layer, where there is a scale indicating, in millimetres (twenty-fifths of an inch), the quantity of butter. By means of a table compiled by Marchand it is very easy to determine the amount by weight contained in 1,000 grms. of milk.

The chemical analysis of milk varies according to the time of the mother's meals and the time when the baby has been fed. In 1,000 parts of milk Becquerel and Vernois found the average of eighty-nine analyses to be as follows:

Water .....	889.08
Sugar .....	43.64
Casein and extractives.....	39.24
Butter .....	26.66
Salts .....	1.38
Total.....	1,000.00

Human milk is always alkaline as it flows from the mother's breast, but it soon becomes acid from contact with the air, especially in the case of illness. It has a sweeter, "softer" taste than cow's milk, but its faint,

insipid odor resembles that of the last-named animal. The composition of human milk gives the type of a perfect food and approximates the composition of the blood. Milk is a derivative of blood, to which it bears a resemblance from the ingredients it contains, *e.g.*, casein, albumin, fat, lactic acid, and earthy matters. It differs from blood, as it does not contain fibrin, coloring matter, etc.

*Requisite Conditions of a Good Wet-nurse.*—When, on account of health or social position, the mother abandons the idea of suckling her child, she should procure a good wet-nurse.

There are two kinds of wet-nurses—home or city, and country nurses (*sur lieux et à la campagne*)—but as the former can be seen daily they are preferable, although the expense is a little greater than for a country wet-nurse.

Both must possess similar qualities, one of which is multiparity. A primipara, indeed, seldom has sufficient experience to bring up a child, hence it is better to have a woman who has suckled several children. This should be especially insisted upon in country nurses. Young physicians, however, must be on their guard against imposition. Find out, also, the “age of the milk,” *i.e.*, the time when the nurse was delivered. Old milk is unsuitable for a new-born child, not having the laxative properties, containing no colostrum, and being denser and less digestible. With home or city nurses choose one who has but recently been delivered, and who herself puts her child “out to nurse.” With country nurses, who do not receive pay enough for them to make such a sacrifice, we must wait till they wean their own children, *viz.*, six to eight months after delivery, when they cut their first teeth. Milk as old as this is proper food, provided always the baby has been gently purged the first two or three days to get rid of all the meconium. A few teaspoonfuls of syrup of chicory or peach-blossoms suffice for this. Another reason that should induce the rejection of a nurse whose milk is over eight months old is that the secretion may dry up before the end of the period of nursing. A new suckling is popularly supposed “to renew the milk,” but this is far from being proven; and if engorgement of the mammæ occurs in such cases, it is because the fresh nursling does not drink as much as the former child.

The age of the nurse is also of importance; she should be between twenty and thirty-five. As to the color of the hair, it is an error to believe blondes do not secrete as much or as good a quantity of milk as brunettes. We only have to cite the Norsewomen to disprove this. Yet we ought to reject red-haired wet-nurses on account of the odor they exhale, rather than on account of the quality of their milk.

If a city, or home nurse is chosen, a *filie-mère*<sup>1</sup> will be preferable, provided the family allow it, because she will demand less and be less encumbered than a married woman.

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<sup>1</sup> An unmarried woman with a baby.



Besides, there is less chance of her becoming pregnant while in the employ of the family. When a country nurse is chosen a married woman is preferable, especially if the family is in pretty fair circumstances and the husband is not a drunkard.

As to health and character of a nurse, we must be even more careful than in the case of a mother nursing her own child. The mouth, cervical glands, and nipple should be examined, and all should be rejected who present traces of any previous disease, rickets, scrofula, syphilis, skin affection, etc. If the woman will allow it, make an examination of her genitals and anus. Home, or city nurses should have a strengthening diet, from which anything cruciferous is to be rigorously excluded.

Wine or water may be allowed them. Baths will aid healthy cutaneous action. Every day, unless the weather be unpropitious, they should go out with the infant, commencing the eighth day after its birth. It is dangerous to carry new-born infants into public parks during the cold seasons. Even in spring the child should not go out before the cord drops off. This to-day is readily effected, since the verification of birth occurs at the house of the parents, and since we may always postpone, for a few days, the ceremony of baptism.

A cause which—according to some—disturbs alike the milk of nurses and mothers is the co-existence of menstruation and lactation. This is not as grave as they would have us believe, and in warm countries, where the nurses frequently menstruate regularly, the children's health is in no-wise altered thereby.

But a nurse who menstruates is more likely to become impregnated, and this fact should lead to her rejection, unless she be unmarried and well watched. We must also reject those who have only *one* breast of milk, for that one may become diseased. The nurse must be shown the child, so that she may learn his health, general appearance, development, and the feel of his flesh and muscles.

To discover whether a child is healthy and thus whether its nurse is a good one, I cannot do better than to quote R. Blache and L. Odier concerning the development of children. The scales are here the measurers of this; and hence the new-born child should be weighed immediately, in order that the variations induced by clothing, etc., be avoided.

RÉSUMÉ OF THE INCREASE IN WEIGHT OF A HEALTHY CHILD DURING THE FIRST YEAR.

	Loss.	Gain.
The first two days of life.....	3.5274 oz. (avoir.)	.....
On the 3d, 4th, and 5th days...	.....	3.5274 oz. (avoir.).
From the 6th to the 120th day..	.....	$\frac{4}{5}$ oz. (avoir.) daily.
After this.....	.....	$\frac{1}{2}$ oz. (avoir.) daily.

A child weighing at birth,  $7\frac{1}{8}$  lbs., avoirdupois, should weigh at the end of the year,  $19\frac{1}{2}$  lbs., avoirdupois.

When a child is to be brought up in the country, choose a place not far distant, so that it can be readily reached, and the nurse surprised if she be inattentive to her duties. Preferably choose a dry, non-marshy spot. For nurses of Parisian children the women of Normandy, Picardy, and Burgundy are best. Those from Orleans, Berry, and Sologne are very bad, because of the localities where they raise the children. These countries are infected with intermittent fever, and the children are usually pale, feverish, and emaciated. They have enlarged abdomens, "ague cakes" (enlarged spleen), and œdematous extremities. They often have the fever, which may pass unrecognized and finally kills them. Of all countries these districts show the highest mortality rates for children.

Among country nurses are some who, not to fatigue themselves, give soups to the child, under the pretext that they are better for the "baby's health." Sometimes the little ones are made to eat of the solid food partaken of by their mercenary nurses. Nothing is more harmful. Infants must suck until they are completely and finally weaned; else rickets and gastro-intestinal disorders result. If the nurse has not enough milk do not hesitate to get another.

§ 2. ARTIFICIAL NURSING.—This includes bottle-feeding and drinking out of a little cup. The latter is to be absolutely forbidden. The bottle may in some cases be advantageous, as it resembles the mother's nipple, yet the mortality rates from "bringing up by hand," in countries where this method of nursing constitutes an industry, are fearful. In these countries and in large cities, nine out of every ten children die before the end of their first year. (Brochard's "Report to the Academy of Medicine.") Certain Parisian families persist in bottle-feeding, saying that they can get pure milk and that from one cow. But as cows are mostly fed on dry fodder they become phthisical; while cows that roam in the fields have to trot home over a long distance, thus get out of breath and heated, so their milk is not desirable.

In the country, with well fed and tended cattle, this plan may, however, be successful.

Women who take charge of the bottle-feeding should be honest and experienced. They should have a handy apparatus, try to give the milk always at the same temperature, and always clean the bottle of its very last drop, as milk rapidly sours. The tip of the tube should always be washed carefully. This tip should be smooth, not spongy or porous, or milk may remain in the chinks and interstices. With precaution stomatitis and "the thrush" may be avoided, both diseases developing rapidly when milk is sour. At first it is well to dilute cow's milk with  $\frac{1}{4}$  to  $\frac{1}{3}$  of sugared water, thus causing the former to resemble more closely the human female's milk. (Brochard.) Joulin advocates the administration of undiluted cow's milk.

We do not reprehend to so great an extent bottle-feeding adopted

several months after the employ of a wet-nurse. The child is stronger, and it will not suffer so much then by being "brought up by hand." In some cases where the child is born prematurely and has not force enough to suck, the bottle may be very serviceable, and later on, indeed, the child may nurse naturally.

§ 3. SUCKLING BY THE FEMALE OF SOME OF THE ANIMAL SPECIES.—There was once a time when children were suckled by certain animals.

The she-goat was the animal usually chosen. The size and form of its teats, which could be easily seized by the child, the abundance and quality of its milk, the ease with which it was brought to the child to be suckled, and the affection it was capable of developing for its nursling, these, says Desormeaux, are reasons for the choice of the goat. But the animal demands a great deal of attention, and the child is in danger should its nurse become restive and irritable. It does not appear true that goat's milk rendered children nervous. The she-ass is also recommended; indeed, its milk bears a closer resemblance to human milk than the goat's, but the undomestic condition of the ass and the difficulty the child has in seizing its teat have led to its being abandoned for bottle-feeding.

#### ART. III.—VACCINATION.

This is an operation wherein we introduce upon a skin-wound a virus called vaccine, in order to guard against the occurrence of small-pox in the one operated on.

This virus is found in the pustules which spontaneously develop on cows' udders. This discovery is due to Edward Jenner, whose works were published in 1798. This condition is cow-pox, and is rare. In practice vaccine is taken from children from six to eight days after vaccination. Thus vaccine is propagated and cultivated.

We may vaccinate at any time of the year and at any period of life. If there be a small-pox epidemic, inoculate during the first few days after birth. (Depaul.) But we usually wait till the children are two or three months old. It is never too late to vaccinate an individual, and vaccine works as well on an old person who has not had variola as upon a young infant. Inoculation may be performed upon any part of the body, but the arm, just below the insertion of the deltoid is the spot commonly chosen. A single scratch serves as a vaccination and protects against variola, but since it often happens that it "does not take," we usually vaccinate each arm thrice, either in the form of a triangle ( . . . ) or in one straight line ( . . . ) with an interval of a little over an inch between each one. The simplest plan is to cover with fluid vaccine the point of a vaccinator or an ordinary lancet. Prof. Depaul, in the numerous cases he vaccinates at the Académie, uses a needle, which he covers with vaccine from the arm

of one previously vaccinated and then thrusts perpendicularly into the arm of the one he is to vaccinate. Usually, if we vaccinate "from arm to arm," we dip the instrument into the vesicle after each thrust to get a fresh supply. But this need not be done when the point of the lancet is thoroughly covered with the virus at the first dip. When dry vaccine is used we must first dissolve it in saliva or tepid water. Then squeeze the back of the arm to tighten the skin in front and thrust the lancet, held flatwise, horizontally beneath the epidermis for  $\frac{1}{2}$  to  $\frac{1}{4}$  in. Then pull it out, turning it and lifting up the blade, so as to wipe it on the lips of the little wound, thus favoring the introduction of the virus. It does not matter if a drop or so of blood flows. Let the incision dry by exposure to air, and then tie up the arm in soft linen so that the clothes may not irritate the spot.

*Changes at the Point of Vaccination.*—A few moments after the operation, an areola, which lasts a few seconds, nearly always forms about the spot. For three days no change occurs at the site of inoculation. But at the end of the third or on the fourth day a red, hard, and prominent elevation appears, soon enlarging and causing more or less itching. On the sixth day it enlarges further, but becomes flattened and umbilicated at its centre. The zone of engorgement that circumscribes the umbilicated vesicle and the pruritus increase from day to day, and by the ninth or tenth the vaccine-vesicle is fully formed, containing a clear, thin, transparent fluid. There may be fever, restlessness, a sense of *malaise*, or a painful swelling of the axillary glands. On the eleventh day the vesicle shrivels, the areola pales and becomes yellowish, and the contents of the little blisters are purulent instead of serous. Desiccation now occurs, the crust or scab falling off on the twentieth or twenty-fifth day. A honey-combed or reticulated pit is left, of a pearly-white color. This cicatrix never disappears.

Such is the normal course of a vaccination; but the course may be irregular and we have what is called *false vaccination*. This occurs in those who have already been vaccinated or who have had variola. False vaccination also occurs in those who have been operated on with a poor instrument, as a ragged-edged lancet, or with lymph of a poor or perverted quality. In false vaccination there is no period of incubation, and suppuration occurs on the third to fourth day. The scab is often a long time dropping off; but it may fall off at the end of five or six days, to be reproduced, an occurrence met with very often in all forms of ulcers. False vaccination leaves no reticulated scar.

The inflammation which sometimes follows true and false vaccination often needs poultices. Liquid food and cooling drinks are to be ordered if there is much fever.

*Requisites.*—The child from whom the lymph is taken must be healthy and robust. It should not be under three months old, for congenital



syphilis might be present and fail to show itself, in many cases, until six weeks or two months after birth.

The vesicle must be at its sixth to eighth day of development before we can get sufficient virus from it. Good lymph is clear, transparent, limpid, slightly viscid, and should flow slowly from the puncture. Then we may vaccinate from arm to arm or gather the lymph for future use.

*Preservation and Transmission of Lymph.*—Vaccine is kept in various ways: on the blade of a lancet or at the end of a sharpened goose-quill.

But vaccine can thus be preserved only a short time. When it dries, dip the end of the instrument in a little warm water and then operate as when vaccinating from arm to arm. Another plan is to collect the vaccine on little square plates of glass, of equal size. These are the plates presented to L'Académie de Médecine.

To charge them, make several punctures in a vesicle and wait till the virus exudes. When this occurs apply one face of a little plate, charge it, then a face of a second plate, and when this is charged press the two wetted faces of the squares together, thus hermetically sealing them. Never allow blood to enter. To preserve the plates wax their edges, or put tin-foil around them. Then they are to be wrapped in paper and put away in a dry, cool place. When used, separate the plates, moisten the lymph with steam, or a little saliva, and use the lancet-tip for collecting and gathering it up.

This method is less successful than vaccination from arm to arm, nor can the lymph be preserved as long in this way as in Bretonneau's capillary tubes: hence we prefer the latter when vaccination from arm to arm is impossible.

By reason of "capillarity" one end of a small tube may be placed on a vesicle that has been freely punctured, and the lymph will rise. When the tube is full, close its ends by heating them in a Bunsen flame, or sealing them with wax.

Fiard's tube is very ingenious; it is  $2\frac{3}{8}$  to  $2\frac{4}{5}$  in. long, and at one end is a bulb like that of the thermometer. Heat the bulb with the hand to rarefy the air, and then place the other end of the tube on a vaccine vesicle, when the lymph will rise as the air in the bulb cools. To expel it, we only have to heat the bulb.

When capillary tubes are used, break off the ends, blow through one, receiving the lymph on the lancet or finger-nail.

Animal vaccine is derived from true *cow-pox*. It comes from inoculating heifers, whence we take the vaccine-virus. This method has advantages and disadvantages. It is serviceable when human lymph cannot be had.

## ART. IV.—DENTITION.

Without entering into the genesis of the dental follicle we shall consider dentition in its relationship to lactation, along with the phenomena to which it may give rise.

Dentition is the most critical period of early infancy. The first teeth usually appear about the sixth month in healthy children ; sometimes, however, children are born with teeth. Any delay in dentition denotes ill-health, the beginning of rickets, or faulty nutrition of the osseous system.

The two lower middle incisors are usually the first to appear, one after the other. Then, in succession come the two median incisors of the upper jaw and lateral upper and lower incisors : these are the first eight teeth. With this crop, or after an interval, toward the end of the first year, the first four molars appear in succession and soon after the four canines : hence there are sixteen teeth in the second year. Then four more molars slowly come in and the set of "milk teeth" is completed, numbering twenty. This is the first dentition ; and the teeth last till the seventh year.

Just before the teeth appear the child exhibits great salivation and chews whatever it can lay its hands on. It is irritable, suffers from insomnia and cries continually, though this condition does not last very long.

Its gums, of a pale rose color, have surmounting them a thin rim, showing that the first tooth will *not* very soon appear. Then we may give it dry marsh-mallow root or an ivory ring on which it can chew, thinning of the gums being promoted in this way. Soon this rim disappears and the tooth shows itself. The alveolar arches lying, above, between the molar tuberosities, and, below, between the coronoid processes grow and accommodate themselves to the successively appearing teeth. The maxillary bones increase in size, the rami become vertical, the angle is more marked, they become higher, while the alveolar rims diminish in thickness after exit of the teeth.

Since, during this period the alveolar arches do not follow the widening of the bones, it follows that, at the age of two and a half years, the mental and infra-orbital foramina are farther from the symphysis than the anterior molar ; they then correspond to the interval comprised between the roots of that tooth.

Dentition may be pathological : the number, direction, situation, union, and development of the teeth may be abnormal.

But the milk teeth being but temporary, these anomalies are of no importance.

*Morbid Phenomena of First Dentition.*—Among the laity most of the diseases of infancy are attributed to teething. The difficulty in observing the maladies occurring at that age has helped to extend this notion, which

has now become a popular prejudice. Teething troubles are not constant, and in a very large number of children never occur at all.

The symptoms are divided into local and general. Among the local are :

1. Swelling of the gums, which become soft, and painful to the slightest touch ; hence some infants keep the mouth open and gaping, the saliva collecting behind the lower lip.

2. Tense gums, necessitating, oftentimes, a few incisions with the lancet.

3. Aphthæ, occurring at the junction of gum and lip, the internal surface of the cheek, and upon the tongue. There are little gray ulcers covered with pseudo-membranes, painful, and later on leading to ulceromembranous stomatitis. These are cured with rose-honey, alum, chlorate of potash, or by cauterization.

4. Simple stomatitis or ulceration of the whole mouth, giving rise to great suffering, preventing sleep, and rendering the child irritable and miserable.

5. Cervical adenitis, swelling of glands in the neck, that may go on to the formation of submaxillary abscesses, becoming dangerous, as they sometimes run into scrofula.

*General* symptoms are sympathetic chiefly : convulsions, inflammation of mucous membranes, and many skin eruptions.

1. Convulsions are the gravest sympathetic symptoms of dentition. They are due to some unknown modification in the nervous system, whereby its actions are markedly deranged, although there is no discoverable post-mortem lesion. The child may suddenly lose consciousness and remain immovable, except for slight convulsive twitchings about the eyes and mouth. Such an attack is called an internal convulsion. Sometimes, with loss of intelligence there are severe convulsions of the face and limbs. The eyes are fixed and deviated from their axis ; the eyelids tremble, the mouth is contorted, and the expression of the face is horrible to look upon. The limbs are also stiff and rigid, but in continual motion. Such a convulsion only lasts a few seconds. The attacks cease when the tooth appears. In some children such symptoms occur as a sort of nervous habit, in the form of intermittent convulsive paroxysms that may pass into true epilepsy, a disease often originating in this way, according to Bouchut.

When a convulsion is severe the loss of consciousness that follows may cause death, so prolonged is it.

When a child has teething convulsions it should be completely undressed and should receive all the fresh air possible ; air should be blown into the nostrils, or vinegar or ammonia and water may be held under its nose. The body should be briskly rubbed, the palms of the hands should be slapped, and we should administer some syrup of linden blossom or ether, a very little at a time. A few drops of cherry laurel water or of

tincture of musk may be administered in a teaspoonful of sugared water.

To prevent a return warm baths may be given and enemata may be administered containing assafœtida, chloroform, or chloral, or we may prescribe the daily administration of a few tenths of a grain of valerianate of zinc, valerianate of ammonia, oxide of zinc, or syrup of ether.

When children have had an eruption on the face from the first appearance of the teeth, and when this has disappeared, we may excite suppuration behind the ears either by means of epispastics alone or by means of vesicants. This mild irritation produces beneficial derivation during the teething period.

2. Inflammation of mucous membranes, especially of the conjunctivæ, larynx, bronchi, stomach, and large intestine, occurs during dentition, to cease when the teeth appear. Conjunctivitis disappears before remedies found advocated in works on ophthalmology. Laryngitis and bronchitis merely demand sedatives. Vomiting is very common when the first teeth come in. The irritated, nervous child is in great pain, is in want of sleep, and soon suffers from dyspepsia; it often rejects in bulk all the milk that it has just taken.

Diarrhœa occurs far more often than vomiting; the number of passages is far greater than normal; and since the flux occurs every time a tooth comes in there can be no doubt as to the cause. The stools are yellow, glairy, mingled with ropy mucus like the white of egg, and sometimes have a greenish appearance, small bits of whitish curds appearing in the dejecta. The children suffer intense colicky pains, so that they shriek and roll about. Borborygmus occurs. Soon they grow pale, their muscles become soft and flabby, and there may follow actual inflammation of the bowels, terminating fatally. In these cases give less milk, forbid broths of any kind to be administered, and resort to opiate enemata or injections of bran, rice, gum arabic, albumen, or gum containing bismuth. Poultices may be applied over the belly.

3. Among cutaneous diseases we find on the face or body urticaria, roseola, eczema, and especially impetigo. The last disease is attended by critical febrile symptoms, which later complicate the skin disease, which itself resists treatment in most cases, finally demanding bran baths, bran washes, or the use of sublimate.

Suppuration in the ear has also occurred, following small skin ulcerations. A hard and adherent scab usually covers the top of the hairy scalp, and this yellow, scaly, crust should be distinguished from favus. It may occur independent of dentition, and is vulgarly called "the cap." It should be removed, whatever be said to the contrary by the laity, for it obstructs perspiration while its least disadvantage is the prevention of growth of the hair.

Well-cared-for-children are just as liable to have it as those who have



been neglected. Sometimes a good brushing will remove it ; again it is so adherent that we must apply oily applications or poultices over the head, taking care, however, that no draughts strike it.

#### ART. V.—WEANING.

Some children wean themselves and refuse to suck. When we wish to deprive infants of their habitual food and have them commence a more independent existence, we must *gradually* accustom them to the food they are to have for the rest of their life. This is often a critical period, either because the change has been ill-managed or because it is made inopportunistically. When the nurse wishes to take the child from her breast she only has to cover the nipple with some bitter substance.

When should a child be weaned? How should a child be weaned? These questions we purpose to answer, and then shall end the article by a description of the treatment of mother or nurse after weaning.

The child should suck until it is twelve or eighteen months old, unless the mother or nurse is dangerously ill.

Some, however, advise that the child be weaned when the incisors come in ; nature, they say, then shows that the child is capable of taking care of itself in the way of feeding. The child then bites the nipple and causes his nurse great suffering.

It is very harmful to wean a child too soon, for he is unused to the food then given him, and, besides, during dentition the breast is a great source of consolation to him, since he will suck at that in the hope of getting relief from pain.

We should wait till dentition is well advanced or wholly ended, hence weaning should occur when the child is a year or a year and a half old.

Personally, I choose a period of rest between the exit of the teeth and forbid the breast after the canines appear. In this way the child has fifteen milk teeth, and there only remain the last molars, which usually come in with the greatest ease.

Too commonly do physicians and midwives allow children to be weaned while they are cutting their first teeth.

Strong, healthy children should be weaned sooner than the weak and sickly, and *all* children should be weaned gradually, nor must we postpone the process too long, for then not only is it difficult to wean the child but he may also suffer from not having substantial nourishment.

As to the second question. When the child is to be weaned cease suckling him at night and accustom him to food that is to be his future *régime*. In this way we do not deprive him of milk until his system has been prepared for different nourishment.

He may have a little bread, sugar and water, a weak "coffee" made from sweet acorns, or a little thin soup once or twice a day. At first give

him little bits of meat to suck, then at the end of a month cease the milk diet abruptly. Of course he cries and obstinately refuses other food, but he is not sick and we must not yield to him, for quickly he will make up for the loss of the breast by taking the food offered. During the month of weaning, the nurse had better eat less succulent food—food not likely to “make milk,” *e.g.*, fish, vegetables, etc. She should also take a little nitre so that the urinary secretion is augmented while that of the milk will be diminished. She must protect her breast from the cold, but should avoid keeping it too warm by covering it up with thick wadding as so many nurses do.

After weaning, the child's diet must be simple and composed of easily digestible food. Besides the soups and vegetables the child may take a little raw hashed meat; but should be prohibited from sweets and cakes offered to children by friends to please the parents.

Children should eat often for they eat but little at a time; mothers of large families and intelligent nurses are well aware of this. If this advice be not taken children may suffer from rickets, phthisis, tabes, mesenterica, and acute or chronic entero-colitis, the result of too solid or too indigestible food. This can be avoided by a gradual transition from a milk to a solid diet.

*Treatment of Mother or Nurse after Weaning.*—Shall we administer cathartics to a woman who has just weaned her child? There is a widespread, imperative rule among the laity to purge under all circumstances. But there is no reason for this if a woman's milk has gradually disappeared, unless indications therefor exist in the *primæ viæ*. Purging, when the appetite, digestion, and sleep are excellent, only derange the woman's health.

It is a useful measure, however, when the breasts are engorged and threaten to form abscesses, either because the child has suddenly died or has been abruptly weaned. In these cases give a cathartic which will withdraw fluids from the intestinal tract. If the child has been abruptly weaned give it the breast again and wean it gradually. If the child suddenly dies, instead of purging empty the breasts by suction for a while, performing the operation less and less frequently, so as to gradually diminish the secretion of milk. The woman must eat sparingly, and in order to avoid reproach for sequelæ we may give, perhaps, as to the puerperal woman, an infusion of periwinkle, a decoction of reed-grass or dog-grass and nitre.

Should there be slight fever, with anorexia, a couple of purges may be given with a week's interval; citrate of magnesia, castor-oil, or Pullna water will serve the purpose.

We have already referred to Weiss' buttermilk as checking the secretion of milk. Hemp-seed oil has been proposed for the same purpose. Poultices covered with chopped parsley have a well-deserved reputation, but they have a tendency to wrinkle and flatten the mammæ.

Finally, since the mother is generally exhausted after weaning, we must adopt measures to combat this anæmia. Bouchut advises a trip to the country or the sea-shore. To those who cannot make a long journey we recommend the mineral waters of Provins (Seine-et-Marne), with the beautiful walks in the romantic valley of Voulzie.

Preparations of quinine and iron may also be successfully employed.

[Belladonna is of service, either applied externally or given internally, when lactation is to cease and the breasts are still secreting milk abundantly. An elegant way to employ the remedy is by the abundant, local apposition of oleate of atropia.—Ed.]





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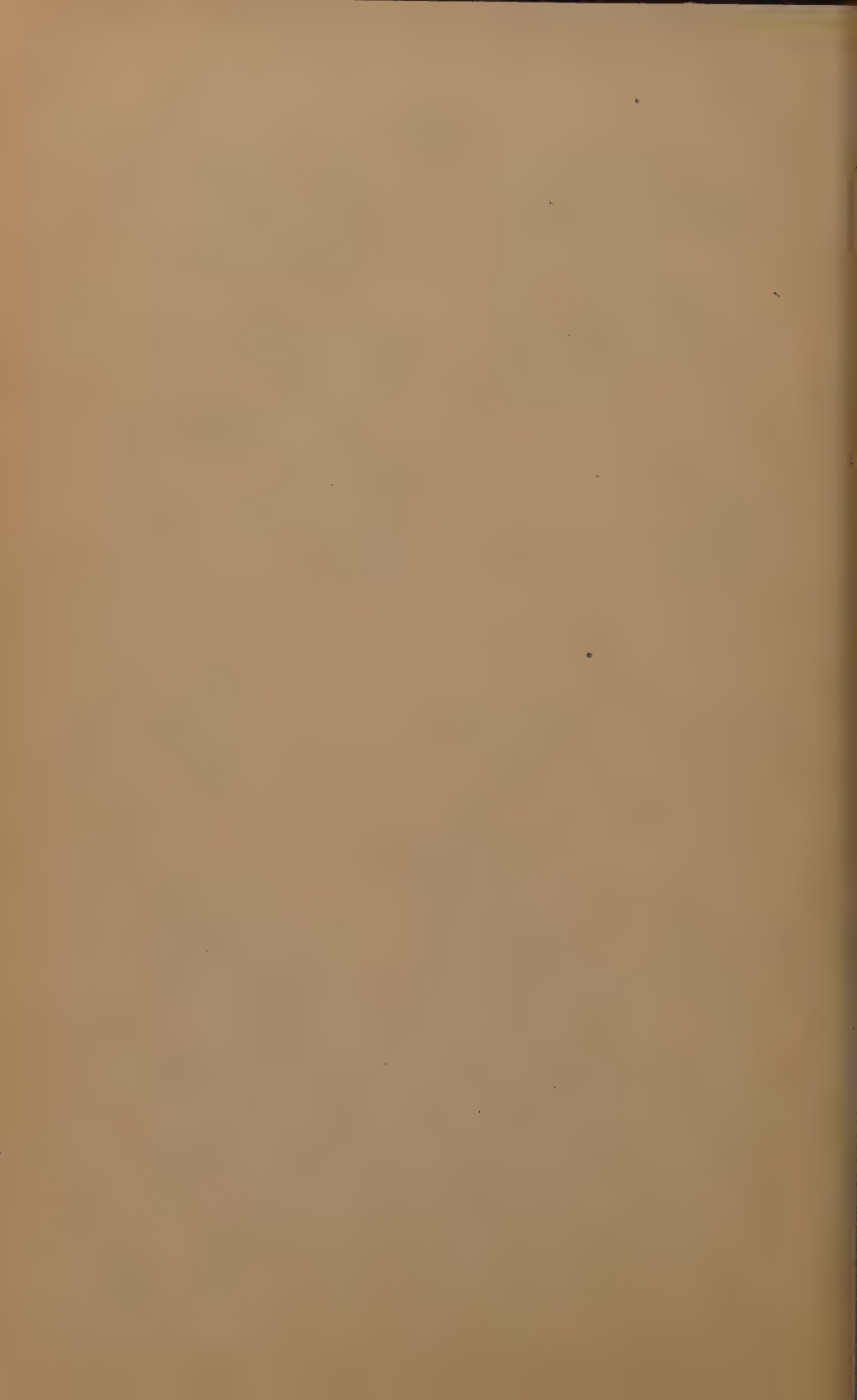
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